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CHEMICAL LIBRARY

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:

ELECTRO-PLATERS REVIEW

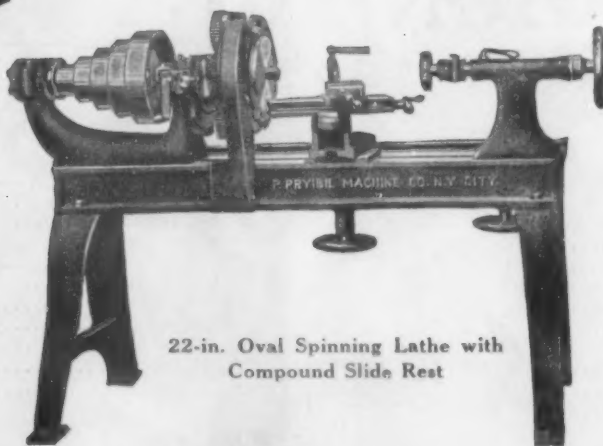
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A MONTHLY JOURNAL RELATING TO THE METAL AND PLATING TRADES

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THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:
ELECTRO-PLATERS REVIEW

Vol. 17

NEW YORK, JANUARY, 1919

No. 1

A NEW WHITE METAL SMELTING PLANT

A BRIEF DESCRIPTION OF THE ESTABLISHMENT OF THE UNION SMELTING AND REFINING COMPANY, INC.,
NEWARK, N. J.

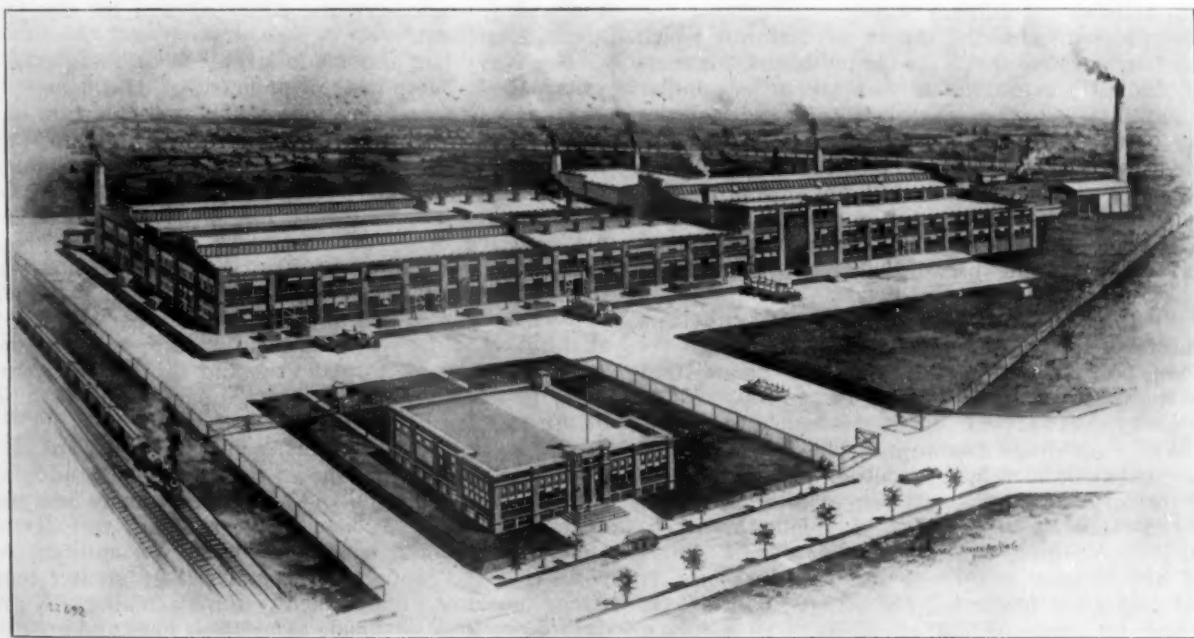
The photograph here shown gives only a faint idea of the completeness of the new home recently occupied by the Union Smelting and Refining Company, Inc., at Newark, N. J. Situated at St. Charles street and Avenue L on a site of 11 acres—sufficient capacity to admit of expansion for years to come, bounded on one side by the Central Railroad of New Jersey and on the other by the Lehigh Valley and the Pennsylvania, the location is certainly admirably well chosen for a plant of its character.

"Yes, we have moved in," stated President L. D. Waixel on the occasion of a recent visit, "but that is about all; we found it a great proposition to keep our

pig and ribbon lead; electrotype, linotype, stereotype and monotype metals; spelter; wire, bar, ribbon, wiping, tinners, capping, canners, spelter, aluminum, triangle, drop and segment solders, genuine, anti-friction, Union special, record and armature babbitts and special alloys according to specifications.

The various departments of the works are smelting and refining of the raw materials containing tin, lead and zinc. Babbitts and bearing metals and mixtures for die castings, while solder in the various forms mentioned above makes up a considerable portion of the product.

Every effort has been made by Mr. Waixel and his



PLANT OF THE UNION SMELTING AND REFINING COMPANY, INC., AT NEWARK, N. J.

New York plants at Fourteenth and Nineteenth streets, running until we could start here and move at the same time, but strange as it may seem we did it and kept our customers satisfied at the same time." It only needs a trip through the works to prove the truth of Mr. Waixel's statements. Inside the main building one is impressed by three things: size, completeness of equipment and the small number of men in comparison to the output.

All told, this plant will turn out upwards of 10,000,000 pounds per month. The products consist of all kinds of white metals, such as tin pipe, ribbon tin, bar and pig tin, tin wire and rod, lead pipe, wire and tubing; bar, block,

assistants to provide for the safety and comfort of the workmen. Sanitation has been given careful consideration in the way of smelting and metal room ventilation and poisonous fume consuming devices. Special attention has been given to the recovery of metallic oxides from the gases and smoke from the furnaces. Elaborate and expensive wash and dressing rooms have been provided and a complete chemical laboratory is also in evidence.

THE ADMINISTRATION BUILDING

As seen from the picture, this building at present is

one story in height, but has been designed in such a way as to permit of adding on several more stories as they may be needed. The details of this building have been so carefully worked out that there seems to be nothing lacking. Beginning with the basement, where there is a complete apartment fitted up for the family of the janitor of the building, we find a well equipped kitchen and dining room where the lunches for the executive heads are served each day. On the first floor are found the offices of the executives, accounting and auditing departments, directors meeting rooms, stenographers, consulting and

waiting rooms for customers. At each end of the building are fine locker, wash and rest rooms for men and women, respectively. There is also a well equipped first aid hospital room in this building.

One particular feature of this office is that customers may carry on their transactions with the accounting department without having to go into the main office at all, a separate entrance having been provided for that purpose.

We hope in the near future to publish a fully illustrated and descriptive article concerning this plant and also one operated at Baltimore by the company.

THE ALUMINUM INDUSTRY IN 1918

A REVIEW OF THE CONDITIONS EXISTING AS TO SUPPLY AND DEMAND OF THE LIGHT METAL AND OUTLOOK FOR THE FUTURE.

WRITTEN FOR THE METAL INDUSTRY BY ALUMINUM MAN.

During the year 1918 the aluminum plants in the territory controlled by the Entente Allies have all been operating at maximum capacity. Not a great deal is known as to the industry in the territory controlled by the Central Powers.

Direct or indirect war requirements have taken nearly all of the metal. Of the metal produced on this continent, nearly 95 per cent has gone for war uses and under the pressure of war necessities, the metal has been applied to a great many new purposes. Every part of our military organization has made use of the metal in various ways. Much of it was consumed, as heretofore, in the automobile industry, a great proportion of this being for use in vehicles for military service.

A large proportion of the output of factories which in normal times produced articles for industrial, commercial and domestic consumption was taken for similar uses in the military service. Nearly all of these factories have also been required to produce articles of more or less special nature for military purposes. Aluminum inevitably, by reason of its inherent physical properties combining a minimum of weight and a maximum of strength, has entered largely into the construction of airplanes and was made use of, wherever it could be adapted as a substitute for other metals.

Naturally it plays its most important part in the airplane motor. The weight of these motors has been reduced to a point between two and three pounds per horsepower capacity and the use of a large proportion of aluminum was necessary to permit this result to be obtained. While aluminum has always been used in automobile engines, where weight reduction is also a factor, such use for airplane motors was very greatly extended, parts of these motors being made of aluminum which, in the automobile engine, are made of other metals. About one-third of the total weight of the Liberty motor is aluminum and even a greater percentage than this is used in one or more of the other types of airplane engine. Many other parts of the airplane beside the engine parts are made of aluminum, aileron frames, gasoline tanks, seat-backs and hoods, for example.

Aluminum also was made use of in the instruments used for observation, photography and communication, which are necessarily carried in war service.

Camp kitchens used large quantities of aluminum cooking utensils and every soldier's individual equipment included an aluminum water bottle, cup and meat pan.

Large quantities of aluminum were consumed, as during the previous years of the war, for the manufacture of explosives, large quantities of ammonal being produced during the year, with a resulting consumption of aluminum powder and nitrate of ammonia.

On account of the scarcity of magnesium during the

early years of the war, aluminum powders were largely substituted where magnesium powders would have been used for purposes of illumination, tracers, etc.

The Government nitrate plant at Sheffield, Ala., consumed large quantities of aluminum in construction of the apparatus used therein for the concentration and handling of nitric acid and in the manufacture of ammonium nitrate. The use of aluminum in this work is necessary because aluminum is more resistant to attack by nitric acid than any of the other common metals. For this purpose there is necessary the construction of very large tanks which are made by bending and welding aluminum sheets together. In many parts of the plant are the piping, condensers and other parts of the equipment are of aluminum.

The Navy has also made large use of the metal, the principal one being in the equipment of its cuisine.

In view of the applications of the major portion of the total available quantity of aluminum to military uses, it is needless to say that its use for the ordinary commercial purposes has been very greatly restricted. The Government has required that the distribution should be made in the order of importance as viewed from the standpoint of winning the war. Some of the non-essential industries have been thereby completely deprived of their supply of aluminum and others partially so, but at the close of the year aluminum was becoming available for application to normal uses and the coming year is likely to see a restoration in large part to the conditions of use existing before the war.

The development work carried on as a matter of necessity during the war has shown the way to many additional peace uses for the metal and undoubtedly many new applications of it will be made as the result of this development. One of the insistent demands for military purposes was the production of material of greater tensile strength and of greater facility for machining. A great deal of progress was made along these lines and improved materials, as a result thereof, are available to the manufacturer of metal products.

The price obtained during the year 1918 was fixed by the Government and maintained, first at 32 and then at 33 cents per pound.

The production during the year, due to the increases in capacity made during the war both in this country and abroad, was greater than that during any year in the previous history of the industry. The producing capacity both for the world and for this country is now greater than it ever has been. With the anticipated revival of peace business it is expected that the demand for the metal during the coming year will be very large, but because of this large available producing capacity, no serious shortage of metal is to be feared.

MODERN METHODS APPLIED TO THE FOUNDRY

AN ARTICLE DEALING WITH THE SCIENTIFIC PRODUCTION OF METAL PRODUCTS.

WRITTEN FOR THE METAL INDUSTRY BY W. R. DEAN, INDUSTRIAL ENGINEER, EXPERT ON FOUNDRY MATTERS.

Having a few spare moments and the inclination and not having contributed to THE METAL INDUSTRY* for some little time, it occurs to me that I might improve those moments and give the readers of THE METAL INDUSTRY a few hints on improved factory management as applied to the foundry methods gained from managing small and large foundries and also at my profession of Industrial Engineer.

The foundry is always the neglected department of a business and also the place where the most money can be saved, but few managers know just how to go about saving in the proper way. When orders pile up and labor gets scarce, moulders want more money, then the manager begins to worry or worry his foundry foreman for quicker deliveries, and to keep costs down, but doesn't point out the proper way. Perhaps the foreman is of the old school or has too many little things to contend with to give proper attention to the scientific or common sense way of getting out increased production and lowering costs with the conditions he has to contend with. Often the manager assumes that the way to meet increased orders is to enlarge or buy new equipment while if he



W. R. DEAN.

Arlington, N. J., industrial engineer, announces that he is branching out for himself as an industrial engineer. Mr. Dean has been a contributor to THE METAL INDUSTRY for a number of years and is an expert on foundry troubles of all kinds.

fifty moulds per day strenuously, how many could he do if he was working efficiently? That problem has to be answered in each individual case. A man may run 10 miles per day and be tired, he may walk 25 miles per day and not notice it. One is strenuousness, the other efficiency. Which have you?

In analyzing your conditions it you go at it in a broad-minded, impartial way as an outsider or industrial engineer you will soon discover that one great weakness lies in your organization and you should organize your industrial machinery in order to co-ordinate the various functions properly using the human body the greatest of all machines as a model.

It has been said that 99 per cent of the enterprises now in existence have no such thing as a chart or diagram showing the essential units of which the organization is composed. Probably 50 per cent of the managers

never heard of such a thing as a chart.

An enterprise having no carefully worked out chart usually has several departments interlocking or else functioning in the wrong place. For instance, how many managers realize that the proper place for the purchasing department is under the factory manager—or that the ordering and planning department come in between the superintendent and foreman, the foreman only carrying out the wishes of the ordering and planning departments.

An organization that cannot be charted is far from being scientifically managed. Mr. H. F. J. Porter has said:

"Management is like a coaching outfit. The coach must be built right before its service is at its best. All its four wheels must be of correct size and its body of correct proportions. The horses must be well matched and strong enough to pull the coach. One must not be a dray horse and another a trotter. The harness must be properly suited to the horses so that the collars will not chafe and irritate them and the traces must be of the same length so as to pull evenly and not permit one horse to get his legs over the other horse's trace and interfere with him. If all these requirements are not met there will be danger of not running straight. Merely speaking kindly to the horses or patting on the neck or giving them sugar or plying the whip, is not going to reach the cause of the trouble. But when this organization is properly arranged so that everything is in its right place, without overlapping or interfering, it is ready for the skilled coachman to get up in the box, take the reins and drive the coach over such roads as they may meet. There is some assurance it will stay in the middle of the road without any inherent tendency to go over into the ditch on either side. The man on the box is the manager and upon his general knowledge of conditions and his skill in handling the organization will depend the efficiency of the organization. This man is an entirely different one from the one who designed the coach or the harness, although he should have very much to say about the selection of the horses."

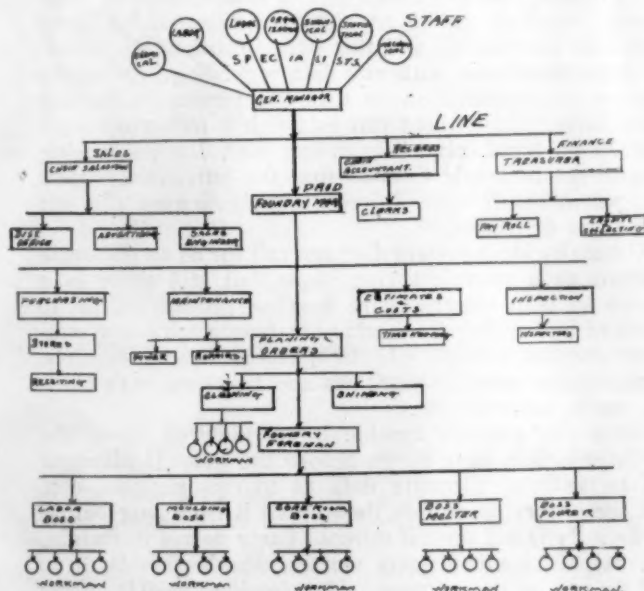


FIG. 1—EXECUTIVE MANAGEMENT CHART.

only knew it his old equipment and men are only about 30 to 40 per cent efficient. Often a manager takes a visitor through his plant and apparently everybody is hard at work, hustling for all they are worth and the manager remarks on how busy everybody is. He doesn't know the difference between strenuousness and efficiency. In a good many shops men are strenuous, in a very few, efficient. A man may make a hundred or a hundred and

*Mr. Dean's last article was "Brass Foundry Practice," published in September, 1917.

Generally speaking an organization has four basic departments which may be compared to the four horses of the coach. They are financial, sales, production and accounting or record as shown in Figs. 1 and 2. Each should be as independent in action as any of the four horses, but all should be so thoroughly related by their harness so as to constitute a uniform and united force in pulling the business.

A general manager usually views his business from the angle of his training. For instance, one will view it as a salesman, another as an engineer, a third as a keen buyer, a fourth as a capitalist. The end of management is the same for all, the principles of management equally universal, but their individual conception is vastly different.

Managers are successful in proportion as they have been able to surround themselves with men who supplement their own powers. In Fig. 2 below, the unshaded portion indicates special abilities the manager possesses. In this case he is strong in production, buying and man handling.

The problem of how best to install new methods of administration in an organization is one which must be solved by each concern according to its peculiar needs.

In large industrial plants where the production is complicated and a great variety of labor is required, the most advisable course is a complete re-organization of the plant based on the finding of an expert industrial engineer

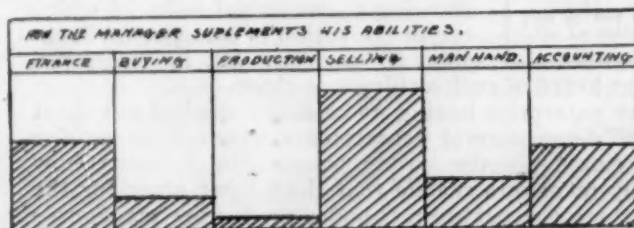


FIG. 2. DISTRIBUTION OF THE MANAGER ABILITIES

after the most careful study and detailed analysis with time studies, etc. This entails a lot of expense and time, but the results obtained more than offset the expenditures.

The first thing, the manager should follow certain lines of investigation which are the same for all plants and point the way to increased efficiency.

First: He will need to obtain exact records in detail of what is being done in the plant. He should have simple but immediate and adequate records as a guide to cost reduction and as a basis for further work, records that will furnish data as to labor, material and equipment.

Second: He should make critical analysis of the data obtained in order to determine the extent to which shop work is falling short of its best performance and fix the responsibility for the failure to either the management, equipment or men.

Third: He should fix from analysis of the data obtained standards of performance, which should be strictly adhered to.

Fourth: He must devise plans of management which will insure the attainments of the standards set.

The main problems of management may be divided into four heads:

FIRST—MATERIALS.

- (a) Reducing waste of materials.
- (b) Storeroom management.

SECOND—PLANT AND EQUIPMENT.

- (a) Daily reports.
- (b) Elimination of delays due to
 1. Lack of detail supervision.

2. Defect of machinery.
3. Slackness of employees.
- (c) Production reports comprising the output of
 1. Different employees and efficiency of employees.
 2. Different types of machines and efficiency of machines.
 3. Different grades of material.
- (d) Standardization of equipment.
- (e) Plant layout.

THIRD—OPERATIONS.

- (a) Investigating past records of individual output.
- (b) Unit time study.

FOURTH—PERSONNEL.

- (a) Reward of individual achievement.
- (b) Various plans of bonuses for efficiency.
- (c) Instruction of employees.

FIFTH—ORGANIZATION.

- (a) Functions of a planning or production department to carry out efficiency methods.

The key to the whole situation of foundry efficiency lies in the selection of proper materials and supplies, properly handled in the storeroom and having the right materials on hand in the right quantity at the right time. Many foundry men don't realize this and are constantly low on some kind of metal or some standard supply and have to have the purchasing department hustle around at the last minute and procure something else as a substitute.

There should be a carefully worked out purchase plan and standards set and the purchasing department should live up to the standards. Very often some near sighted purchasing agent will pick up odd lots of metals and supplies at lower figures and the saving in such is often offset by loss of time and added cost in manufacturing. The normal consumption of any kind of material or metal should be ascertained and this data furnished the ordering department also with any data regarding prospective changes in consumption so that the person controlling the ordering department can establish a minimum stock to keep on hand, place his orders with the purchasing department in ample time so that the purchasing agent can get in touch with different supply houses and get prices and deliveries.

A foundry store system does not call for as an elaborate detail as a manufacturing plant, but still there is a chance to help materially in keeping production up to standard by keeping on hand at all times a minimum supply of shovels, riddles, vibrators, vibrator parts, brushes, standard size nuts for machines and furnaces, core binders, sands, firebrick, etc.

Often the greatest trouble is encountered when the purchase orders have to go before the general manager and he without adequate data as to consumption, etc., cuts the orders or cancels them, then it isn't long before the foundry is out several things. Long delays in freight, etc., help to make matters worse. Production is often held up just on this account. If a classified weekly report was laid on the manager's desk showing delays in production due to cancellation or orders cut, he would soon begin to realize the necessity of improving his store supplies or management. There should also be a weekly inventory on the manager's desk, every Monday morning showing the weekly consumption of metal supplies, etc., and balance on hand. An analysis of this report will soon show if some certain article is inferior and the consumption is abnormal. He can then take up the use of this article with the proper person in charge.

(To be continued.)

PLANNING A METAL FINISHING DEPARTMENT

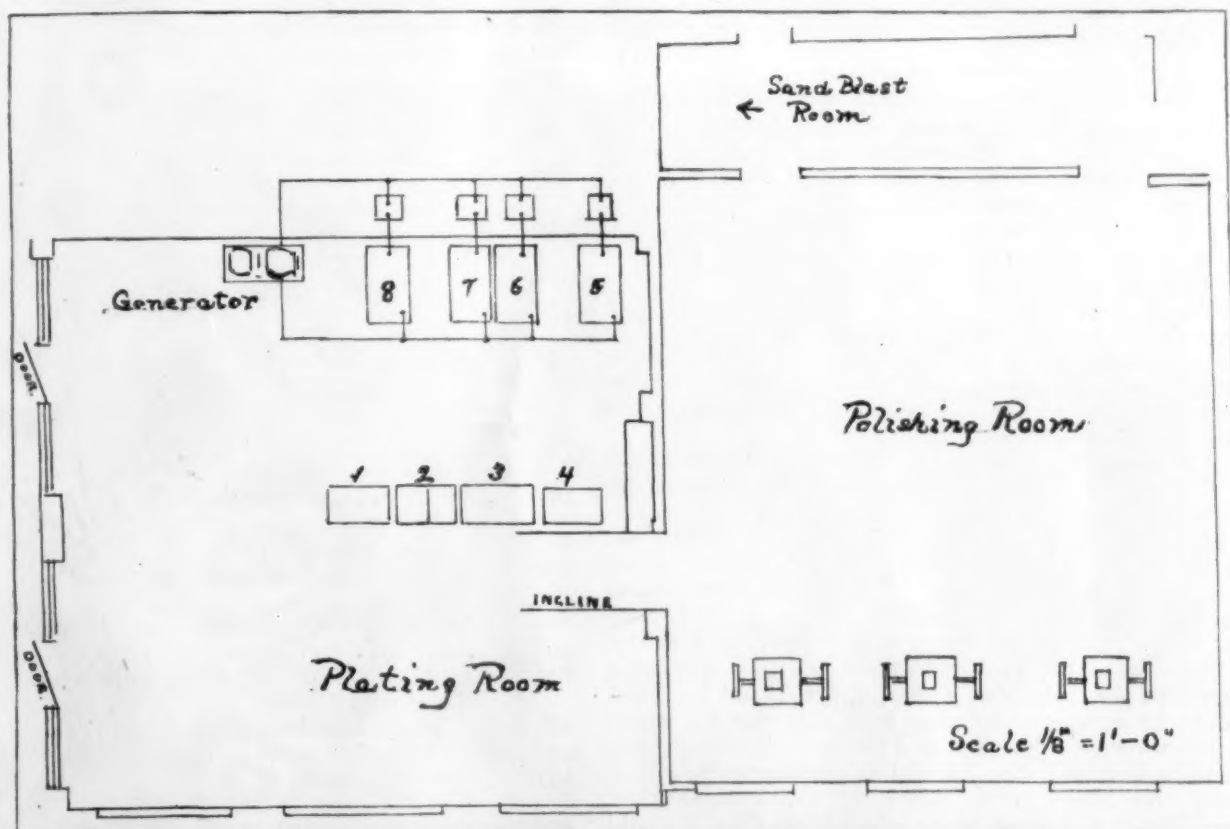
HOW AN EASTERN ELECTRO-PLATING EQUIPMENT ENGINEER SOLVES A PROBLEM FOR A MIDDLE WEST CONCERN.

THE PROBLEM.

A concern engaging in the metal finishing business gives their desired monthly production of finished goods as follows:

Monthly Production		Surface Area	Weight
2,000	6-lb. Sad Iron		
	Cover	86.4 sq. in.	12 oz. C. R. Steel Buff.
	Terminal Cover and Support	35 sq. in.	3 oz. C. R. Steel Buff.
	Bottom Casting ...	42 sq. in.	2½ lb. Cast Iron Buff.
	Stand	144 sq. in.	12 oz. Steel Wht.
	Handle Strap.....	20 sq. in.	C. Steel Buff (nickel).

	Terminal Cover...	15	sq. in.	2 oz. C. R. Steel Buff.
	Screen	108	sq. in.	5 oz. Wire Wht.
	Handle (one)	2	sq. in.	1 oz.—4 required Steel Buff.
500	Tray	250	sq. in.	16 oz. C. R. Steel Buff.
	Curling Iron			
	Tube	8	sq. in.	2 oz. Brass Buff.
	Tong	6	sq. in.	1 oz. Steel Buff.
350	"D" Air Heater			
	Leg	10	sq. in.	4 required Cast Buff.
	Corner Pieces	8	sq. in.	4 required Cast Buff.
250	3-19 Range			
	Shelf Trim	64	sq. in.	C. R. Steel Buff.
	Handle	10	sq. in.	C. I. Buff—2 required.



PROPOSED ARRANGEMENT OF A PLATING AND FINISHING PLANT.

500	3-lb. Sad Iron				
	Terminal	3	sq. in.	1 oz.	Steel Buff.
	Cover	48	sq. in.	3 oz.	Steel Buff.
	Bottom Casting ...	35	sq. in.	1 lb. 10 oz.	Cast Iron.
	Strand	72	sq. in.	½ lb.	Steel Wht. Nick. (Buff).
	Handle Strap.....	11	sq. in.	2 oz.	Steel Buff.
250	Disc Stove				
	Case	71	sq. in.	4 oz.	C. R. S. Buff.
	Terminal Cover ...	15	sq. in.	1 oz.	C. R. S. Buff.
	Foot (one)	5	sq. in.	1 oz.—3	required.
2,000	Turnover Toaster				
	Base	110	sq. in.	10 oz.	C. R. S. Buff.
	Top	50	sq. in.	4 oz.	C. R. S. Buff.
	Side (one)	15	sq. in.	2 oz.—2	required St.
	Element Supports..	11	sq. in.	½ oz.	Steel Wht. Buff.
	Sub Base Cover... 20	sq. in.	2 oz.	Steel Wht. Buff.	
1,500	Toaster Stove				
	Case	159	sq. in.	10 oz.	C. R. Steel Buff.
	Foot (one)	4½	sq. in.	1 oz.—4	required Steel Buff.

Shelf Bracket	.... 125	sq. in.	Cast Iron Buff.
Corner Bracket	... 12	sq. in.	Cast Iron Buff.
Conduit	..... 40	sq. in.	Steel Buff—2 required.
Circuit Breaker			
Front	..... 90	sq. in.	Cast Iron Buff.
2-19 Range			
Conduit	..... 30	sq. in.	Steel Buff.
Handle	..... 15	sq. in.	Cast Iron Buff.
200 No. 22 Hot Plate			
Base	..... 325	sq. in.	Cast Iron Buff.
Leg (one)	..... 8	sq. in.	C. I. Buff—4 required.
31 Hot Plate Base	144	sq. in.	Cast Iron Buff.
21 Hot Plate Base	170	sq. in.	Cast Iron Buff.
Round Hot Plate			
Base	..... 75	sq. in.	Cast Iron Buff.
4,000 Cozy Glow Reflector	..... 300	sq. in.	Copper Plate and Buff.
Guard	..... 32	sq. in.	Copper Plate.
Oven Heater	.... 55	sq. in.	Casting, Wht. Nick.—2 required.

Boiler Heater	48	sq. in.	Casting, Wht. Nick.
Over Door Plate..	50	sq. in.	C. R. Steel Buff.
Boiler Door Plate	32	sq. in.	C. R. Steel Buff.

Based on the foregoing information together with a sketch of available space for the plant they ask the following:

Size dynamo?
Size motor?
Number and arrangement of tanks?
Other equipment required?
What supplies required? (Such as compounds, chemicals, acids, polisher's supplies, etc., and in what quantities per month?)

Number of polishing and buffing lathes required?

Number of men or boys required in plating room?

Note—They have 6 good tanks 29 inches wide by 52 inches long, 28 1/4 inches deep inside dimensions, which they would use at first, but the layout should provide for replacing them later with larger tanks if desirable.

THE ANSWER.

BY AN ELECTRIC-PLATING EQUIPMENT ENGINEER.

Referring to the proposition outlined above, I note the plan of room submitted, together with the different groupings of articles to be treated, and the square foot of surface and number of pieces.

I have analyzed the statement and reduced the figures to an hourly output and I find that it would be necessary to turn out three hundred pieces per hour.

To do this work, bearing in mind that I have not seen the pieces mentioned, I calculate that it would take four polishers to do the polishing and one buffer or finisher to do the coloring. It will also require one foreman plater and a boy as an assistant. This would represent the labor cost.

It is stated that there are six tanks, size 52 inches long, 29 inches wide and 28 1/4 inches deep. These tanks can all be utilized. I would use three of them for the nickel-plating tanks and one for the copper-plating tank; one of the tanks for a hot water tank and one for a cold water tank. I would suggest that the cold water tank have a partition put across the center so that there would be fresh water for rinsing purposes. I submit a drawing of the proposed layout of tanks and have numbered the tanks Nos. 1, 2, 3, 4, 5, 6, 7 and 8. No. 1 would be a new rectangular iron tank for lye found in the estimate. No. 2 would be the cold water tank, partition in center; No. 3 would be the wooden hot water tank, and No. 4 would be a steam-heated sawdust box; Nos. 5, 6, 7 would be nickel-tanks, and No. 8 would be a copper tank.

To turn out the work specified there would be needed equipment and supplies on the list below. Motor generator set includes, of course, a motor, mounted on the same base with the generator. The different fittings and pipes and conductors for tanks would be necessary to complete their equipment so they could be used for plating.

Under the head of supplies for plating room I have included different chemicals required for making up the solution, and for a supply of chemicals and materials required to run the room for a period of perhaps three months.

It is understood that the nickel anodes would last from one year to one year and a half, depending on the number of days per year that the plant is operated.

I believe that the total expenses for supplies will not exceed \$1.75 per day throughout the year.

LIST OF EQUIPMENT FOR PLATING ROOMS.

1 Direct connected motor generator set, 500 Amp., 6 V.....	\$828.00
1 Plain iron tank for lye, 100 gal. 36x30x27..	67.50

1 Sheet metal sawdust box, 36x18x12.....	46.50
4 Types M tank rheostats, 175 Amp., at \$16.50	66.00
1 500 Amp. C 35 ammeter with shunt.....	16.50
1 15 volt. C 35 voltmeter.....	12.00
12 Pieces brass tubes for tops of tanks, 60x3/4, about 50 lbs.....	32.50
50 Lbs. 3/4 in. copper conductor for main conductors	30.00
10 Lbs. 3/8 in. copper conductor for branch conductors	6.00
8 No. 1 rod connections, 3/4x3/8 in., for main line conductors	4.00
16 No. 1 rod connections, 3/4x3/8 in., for tops of tanks	8.00
2 Earthenware acid proof jars with covers, 20 gal.	12.80

LIST OF SUPPLIES FOR PLATING ROOM.

600 lbs. Single nickel salt.....	\$96.00
100 lbs. Boracic acid	22.00
100 lbs. Chloride of sodium.....	5.00
150 lbs. Copper carbonate	51.00
200 lbs. Sodium cyanide.....	64.00
100 lbs. Ground pumice	8.00
100 lbs. Optimus metal cleaner.....	7.00
2 bags Maple sawdust	2.50
10 lbs. Copper stringing wire.....	6.00
1 doz. 4 row scouring brushes.....	1.91
1 doz. 4 row cotton potash brushes.....	3.28
30 Nickel anodes, 95%-97%, about 540 lbs. @ .60.....	324.00
10 Copper anodes, 99%, about 180 lbs. @ .38.....	68.40
Total	\$1,788.00

3 No. 6 polishing lathes, @\$73.90.....	\$221.70
100 lbs. White Spanish felt wheels, @ \$2.25...	225.00
8 Wood polishing wheels, leather covered, 16x4 in.....	52.00
8 Eclipse canvas polishing wheels, 14x2 in.	27.20
100 Sections, 14x16 oz., fancy sewed buffs, @ \$.5750.....	57.50
100 Sections, 14x18 oz., loose, unbleached buffs, @ \$.9247.....	92.47
400 lbs. Tripoli composition @ \$8.00.....	32.00
400 lbs. White finish, @ \$14.00.....	56.00
400 lbs. Emery paste, @ \$7.50.....	30.00
350 lbs. No. 70 emery, @ \$4.75.....	16.63
350 lbs. No. 80 emery, @ \$4.75.....	16.63
350 lbs. No. 120 emery, @ \$4.75.....	16.63
350 lbs. Flour emery, @ \$3.75.....	13.13
50 lbs. Emery glue, @ \$.50.....	25.00
Total	\$881.89

GOLD DIP SOLUTION FOR BRASS

Probably one of the best immersion gold solutions is prepared with the following materials:

Water	1 gallon
Sodium cyanide	3 ounces
Soda ash (58%)	4 ounces
Gold Trisalyt	3/8 to 1/2 ounce

The temperature of the solution should be from 160 to 180 degrees Fahr. Also replace the water lost by evaporation while working the solution. In replenishing add small proportions of gold Trisalyt, as the solution becomes weak in metal. This will be noted by the gold becoming very pale in color. Occasionally add a small amount of bicarbonate of soda, about 1/4 to 1/2 ounce, as such an addition acts as a brightener to the gold.—C. H. P.

POLISHING OF CAST IRON BY RUMBLING

A DETAILED ACCOUNT OF THIS METHOD OF FINISHING METAL ARTICLES.

WRITTEN FOR THE METAL INDUSTRY BY R. P. MACPHERSON, GENERAL ELECTRIC CO., PITTSFIELD, MASS.

Because of the inability of the writer to obtain information from publications or to receive the desired assistance from manufacturers of rumbling equipment or abrasives on the subject of finishing cast iron by rumbling, he assumes that the results of an extensive, as well as successful, investigation along this line may be of interest to others.

Castings are now being polished by rumbling in closed barrels in the presence of steel slugs, suitable abrasive and water. The finish obtained is as satisfactory in every respect for subsequent lacquering or japanning of the assembled parts, as the finish produced by standard polishing wheel methods, with a saving of as high as 35 per cent on some castings.

the run the steel slugs polish the surfaces of the castings which have been cut down with the abrasive.

In developing this method of finishing castings, six different types of rumbling barrels, a large number of different abrasives, as well as different kinds of slugs for adding weight to the charge and aiding in polishing have been used. The operation has been performed wet and dry, as well as with a maximum and minimum amount of water, also using soda ash and caustic soda in the water.

TYPE OF BARRELS USED.

The barrels finally selected for rumbling are of four types, the larger one being 5 1-2 feet long x 2 1-2 feet square with an opening 3 feet long x 1 1-2 feet wide on

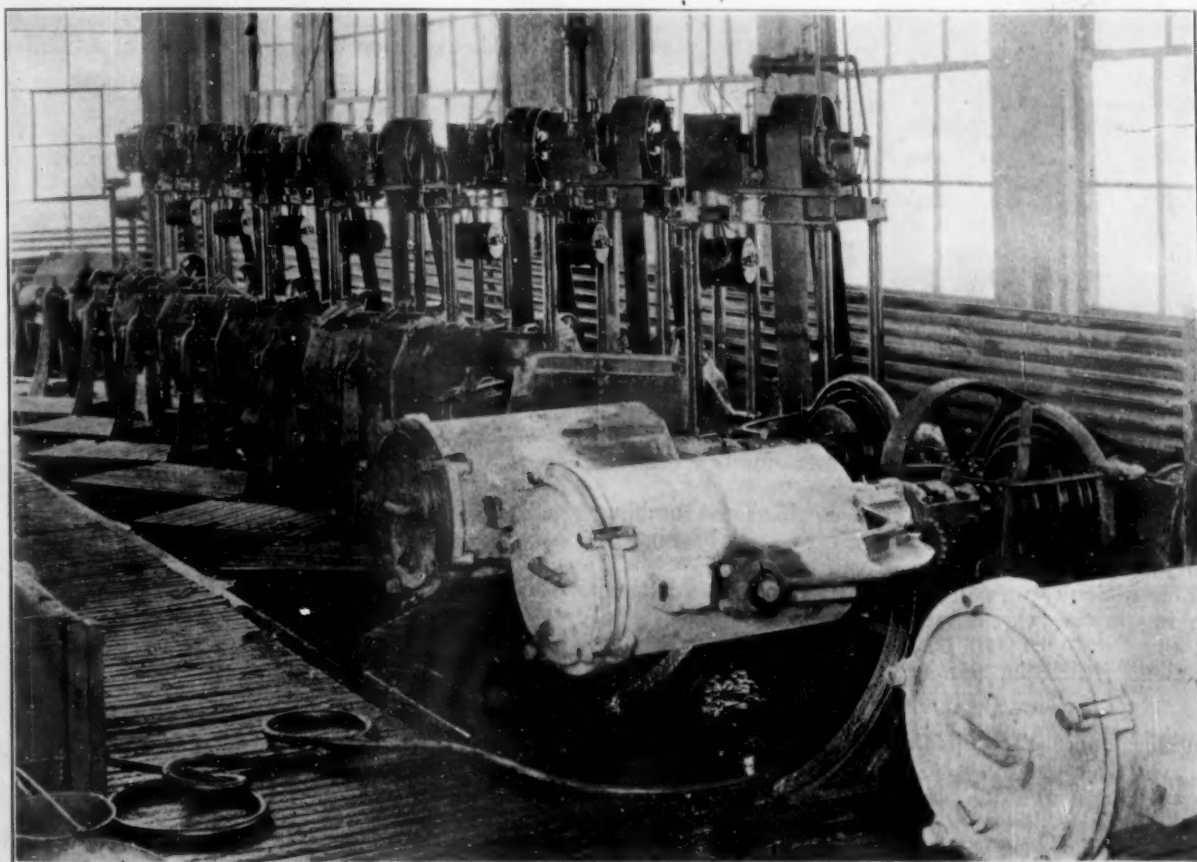


FIG. 1. A BATTERY OF OCTAGONAL TUMBLING BARRELS FOR RUMBLING FAN MOTOR CASTINGS.

The rumbling operation is performed by placing the desired number of castings, steel slugs, grain alundum, and enough clean water to assist the abrasive in cutting, in a water-tight cast iron container and revolved at about 30 R. P. M. The time required to finish a load averages 24 hours. After the castings are properly tumbled, the barrel is stopped and the whole load is dumped out onto a grating covering a drain extending underneath the whole line of rumbling barrels. Water is turned on the load, washing the dirt and slime from the castings and steel slugs. The castings are then ready for machining or other operation, and the steel slugs are used in rumbling the next load.

The amount of abrasive used is such that it is entirely consumed in 18 to 20 hours. During the remainder of

one side for filling. This barrel is supported in the center of each end and revolved in a horizontal position. The loading and unloading is done by stopping the barrels so that the opening comes on top, removing the load by hand. These barrels are shown in Fig. 1.

The next sized barrel is octagonal in shape, 19 1/2 inches in diameter and 29 3/4 inches long. These barrels are mounted singly and in pairs. When mounted in pairs they are placed end to end or tandem. Both the tandem and single barrels are supported in the center of each end and are revolved in a horizontal position, being operated the same as the square barrel described above. These barrels are shown in Fig. 2.

The other type of barrel is 17 1/2 inches in diameter and 29 1/4 inches long. This barrel is octagonal in shape

and is supported in the center of two sides with an opening in one end. During loading, the barrel is tilted in a vertical position with the opening up. During unloading, the barrel is tilted in a vertical position with the opening down, dumping out the load. During rumbling, the barrel is operated on a horizontal axis. Two of these barrels are set up with a single driving mechanism and are known as twin barrels. These barrels are shown in Fig. 3.

The large square barrel will hold about 475 castings of a given size, while the smaller sized barrels will hold about 70 castings of the same size. Although there is an advantage in the size of load in the big barrels the finish obtained is not quite as satisfactory as that obtained in the smaller barrels. Furthermore, the ease and

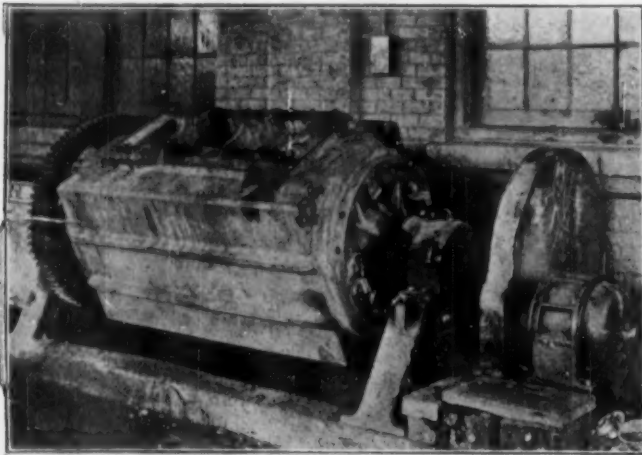


FIG. 2. A SQUARE SHAPED TUMBLING BARREL.

speed with which the smaller barrels can be loaded and unloaded compensates for the greater number tumbled in the larger barrel.

The large square barrels are confined to rumbling large castings, while the smaller octagonal barrels are used for both large and small castings.

Some difficulty was also experienced with the castings breaking in the large barrels due to the weight of load and the length of fall occasioned by the square construction of these barrels.

ABRASIVES USED.

In developing the rumbling of castings, the various abrasives tried out were No. 70 and No. 36 grain carborundum; lump or crude carborundum; No. 70, No. 36, No. 8 and No. 4 grain alundum; various grades of broken alundum and emery wheels; No. 30 and No. 10 angular grit; trap rock; and a few other materials which received no serious consideration.

Broken alundum or emery wheels, crude carborundum and angular grit were considered the most promising of the abrasives available when the investigation was started. The other materials noted above were, however, given a careful trial.

It was found that both grain and crude carborundum broke up into a fine powder after rumbling a short time, and would not cut down the surfaces of the castings, although some tests covered 72 hours' run.

Trap rock was, of course, unsatisfactory regardless of the length of time of rumbling, as it was too soft; the pieces wearing down to round pebbles and not cutting the surface of the iron.

Angular grit, which is chilled steel shot broken up into irregular sized pieces, has quite sharp edges which are supposed to do the cutting. This material would not cut

down the surfaces of the castings, and thus proved to be no better than either carborundum or trap rock. Tests conducted with this material proved it to be of no more value than steel slugs when used without an abrasive.

Broken emery and alundum wheels proved to do quite satisfactory work, provided the proper grade of wheels could be obtained. These broken wheels constitute the scrap or rejected material produced in the manufacture of alundum or emery polishing wheels, as well as the broken wheels which have been worn down too small to be of further use on a polishing lathe. These wheels are composed of various sized grains of different hardnesses. These grains are stuck together, usually with a vitreous binder. Considerable difficulty was experienced in using broken wheels, due to a chemical reaction which takes place between the binder in some of the wheels and the clean city water used in rumbling, assisted by the elevated temperature produced by the friction of the load during rumbling. This reaction produces a large amount of gas which creates a high pressure in the rumbling barrels and sometimes causing serious explosions. In one case this explosion blew the head out of a twin rumbling



FIG. 3. A BATTERY OF TWIN OCTAGON SHAPE TUMBLING BARRELS.

barrel, breaking the cast iron head into small pieces and throwing these pieces 30 or 40 feet from the barrel with considerable force. Several explosions, nearly as serious, occurred while using broken wheels. In order to relieve this condition, the barrels were opened at frequent intervals, thus permitting the accumulated gas to escape. Due to the danger of explosions while using broken wheels, as well as due to the fact that slightly more satisfactory results were obtained with other materials at a lower cost, broken wheels were discarded.

No. 4 and No. 8 grain alundum proved to be the most satisfactory of all abrasives with an advantage in favor of the No. 4, some of the reasons being that No. 4 grain alundum is of uniform hardness, while the grains in

broken wheels have a wide range of hardness running from hard to soft. Furthermore, the effective cutting edges of loose grain alundum are far in excess of the effective cutting edges of an equal amount of grains when present in the form of broken wheels. Grain is also cheaper to handle, as the wheels must be broken up into pieces 1 inch or less in diameter before they can be used.

SLUGS USED.

In order to give weight to the abrasives and to aid in polishing, as well as to help fill in the dead spaces between castings, steel slugs are used. In determining the most satisfactory slug, several materials were tried out, such as boiler plate punchings of different thicknesses, varying from $\frac{3}{8}$ to 1 inch in diameter, brass punchings, pieces of scrap cast iron and lead punchings.

The brass and lead slugs were used at first because it was thought that there might be an advantage in the abrasive charging the surface of the soft metal and in this way produce a condition similar to the surface of rough sand paper, so that when these slugs were forced across the surfaces of the cast iron the abrasive embedded in the slugs would cut the iron. After running a large number of experiments, it was determined that the lead and brass slugs derived no benefit from having their surfaces charged with the abrasive.

Miscellaneous sized pieces of cast iron were used to quite good advantage, although they are not as satisfactory as boiler plate punchings. This material is scrap iron obtained from the foundry, and is of various shapes and sizes, ranging from $\frac{1}{4}$ to $1\frac{1}{2}$ inches in cross section.

Boiler plate punchings of sizes noted above have proved to be the most satisfactory of any slugs used. These flat pieces get into the recesses in the castings, cleaning them out in good shape, and when present in considerable number assist the abrasive greatly in cutting down the surfaces of the castings. The steel slugs not only force the abrasive across the castings during the rumbling operations, but they themselves also do considerable polishing, especially after the hard scale has been cut from the castings and the abrasive has been worn down to a fine powder.

AMOUNT OF WATER USED.

As stated earlier in this article, the rumbling was performed with various amounts of water. It was thought at first that there should be an excess present to keep the surface of the iron and the abrasive clean and free of all fine powdered material so as to permit the abrasive to cut more effectively. It was also thought that an alkali might assist in cleaning these surfaces. The best results were, however, not obtained until the amount of water was reduced to a point where only enough was used to form a thin pasty mass after the grain abrasive had been worn to a powder. It was also determined that an alkali in the water was of no assistance.

RESULTS OF INVESTIGATION.

Test with No. 4 Grain Alundum at $8\frac{1}{2}$ cents Per Pound.

Castings	No. of pieces	Total amount of grain	Cost of Abrasives	
			per 100 castings	per 100 castings
9-inch fan motor frames....	1,750			
9-inch fan motor bases....	4,370			
12-inch fan motor frames....	1,258			
12-inch fan motor bases....	1,256			
12-inch fan motor trunions..	1,160			
	9,794	1,415 pounds	14.45 pounds	\$1.23

At the time that the above run was made a similar test was made with broken alundum wheels at a price of 6 cents per pound, which resulted in a cost of \$1.67 per 100 castings, more abrasive being required.

As a result of this investigation, it was determined that No. 4 grain alundum used with boiler plate punchings in the presence of a small amount of clean water is the most suitable material for polishing fan motor castings by rumbling. Furthermore, the finish obtained is as satisfactory as that obtained by polishing, and can be produced at a lower cost.

READJUSTMENT IN BRASS MANUFACTURING

WRITTEN FOR THE METAL INDUSTRY BY PETER W. BLAIR, MECHANICAL EDITOR.

The great problems of the hour for the brass manufacturers that have been engaged in the production of war materials are: First, adjusting industry to the rapid cancellation of government orders which have taken place; second, affecting the transition, which is bound to come, from war labor costs down to the inevitable necessities of peace operations; third, readjusting material costs gradually down so as to avoid a critical shrinkage of values back to the normal costs of material for peace time.

I think everyone is practically agreed that the brass industry will require time for readjustment. Stocks of goods in dealers hands are low, although they will not stock up their shelves on a high market. The demand for brass goods for marine construction will gradually increase and be very heavy, owing to the large amount of shipbuilding in all parts of the states and which, no doubt, will develop and grow to a large extent during the present year.

The brass manufacturers of the United States did not realize until lately the amount of brass and copper goods that went into the construction of a merchant ship. Construction has been confined largely to the eastern section of the states, but it has now been developed all over and there are prospects of it becoming further developed and also becoming a leading industry. In the leading European shipbuilding centers there are brass manufacturers that specialize in marine brass goods and have a worldwide reputation and demand for their goods in all parts of the world, the same as some of the manufacturers of plumbers' brass goods in the states have gained a reputation for their products.

Manufacturers of plumbers' and steam brass goods can utilize their machines and tools which they have employed on war materials for their products. Quality must be the watchword in the manufacture of marine goods and must come up to full specifications in regards to material and workmanship. Owing to the severe strains and pressures placed on these goods they are in a majority of cases made from bronze mixtures with a low percentage of lead. The machining operations are slow compared to the regular line of brass goods as the metals are very tenacious and tough and in a number of cases a lubricant has to be kept on the tools.

When the industrial readjustment is completed it seems to me that the activity is likely to be as great as that during the period of the war, although along somewhat different lines. During the past eighteen months brass manufacturers have had some striking examples of what an organization, properly and enthusiastically conducted, can accomplish. The great necessity of getting business to ward off trade depression can be applied at the present time along these same lines and results will follow.

DESIGN VALUE OF DECORATIVE MOTIFS

A SERIES OF ARTICLES ON THIS INTERESTING SUBJECT HAS BEEN PREPARED BY THE AUTHOR WITH THE OBJECT IN VIEW OF GIVING THE STUDENT CRAFTSMAN IN ART METAL WORK A COMPREHENSIVE IDEA OF THE DESIGN VALUE OF DECORATIVE MOTIFS, THEIR CHARACTERISTICS PECULIAR TO THE PARTICULAR PERIOD OR STYLE IN WHICH THEY APPEAR AND SO FAR AS POSSIBLE TO EXPLAIN THEIR ORIGIN, SYMBOLIC SIGNIFICANCE AND DECORATIVE VALUE. IT IS THE AUTHOR'S SINCERE HOPE THAT THE SERIES WILL FULFILL THE PURPOSE FOR WHICH IT HAS BEEN PREPARED—SEVENTH PAPER.

WRITTEN FOR THE METAL INDUSTRY BY A. F. SAUNDERS, DESIGNER BENEDICT MANUFACTURING COMPANY, EAST SYRACUSE, N. Y.

ARTIFICIAL OBJECTS.

The several preceding papers of this series have dealt principally with decorative motifs derived from natural forms. Nature always has, and always will, provide the main source of inspiration in decorative design, but rich sources of inspiration are also opened up by artificial objects which are fashioned by man himself. Many such objects offer highly decorative material for the designer in metal if handled in an artistic manner and properly placed in combination with natural forms.

ration for garlands and festoons, or as labels or streamers to bear mottoes and inscriptions. Fig. 7, Plate 13.

In the antique the use of ribbons was confined to simple forms, often terminating in a ball, acorn or tassel, while in the Renaissance they were developed in various free and elegant styles often divided at the ends like a pennon. It was in the dainty and delicate style of Louis XVI that the ribbon reached its highest development as a decorative motif. The flowing undulating ribbon ends and graceful bow knots are among the most typical mo-

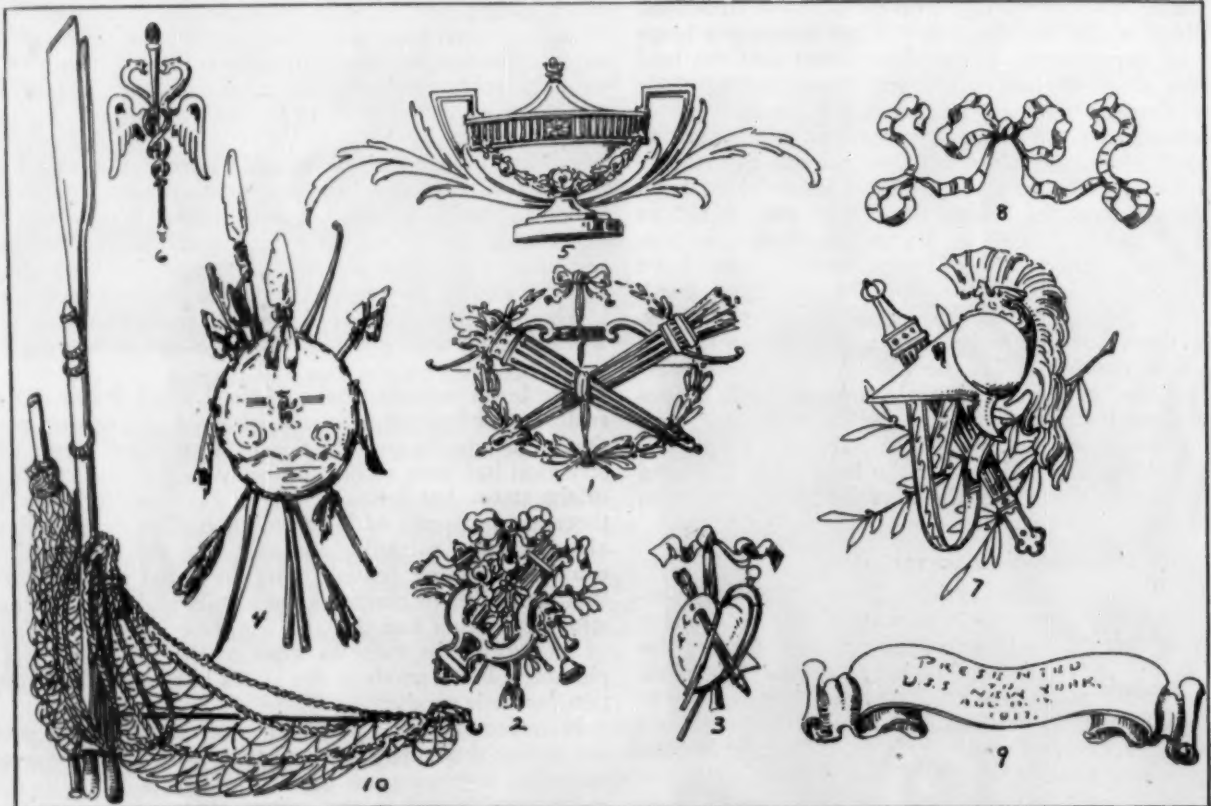


PLATE 13. ARTIFICIAL MOTIFS.

- | | |
|---|---|
| 1. Torch, Bow and Quiver Motif, Louis XVI Style. | 6. Symbolic Motif. Caduceus. Emblem of Mercury. |
| 2. Symbolic Motif. Music. French renaissance. | 7. Trophy. French Empire. |
| 3. Symbolic Motif. Painting. Modern French. | 8. Bow Knot. French. Decorative Motif, Louis XVI. |
| 4. Trophy. Decorative Motif Symbolic of the Chase. | 9. Ribbon Motif for Motto or Inscription. |
| 5. Decorative Motif. Urn. Adam Period. Middle Georgian. | 10. Decorative Motif. Symbolic of the Sea. Fish Net and Oars. Modern. |

Artificial objects include certain architectural features such as the column, capital, pilaster, console, arch, etc. Also many forms borrowed from art, technology and science besides a wealth of miscellaneous objects, some of them perhaps of a most commonplace character, yet susceptible to artistic treatment if studied from the viewpoint of decorative value. For instance, take an ordinary piece of ribbon, it can be twisted and knotted into a variety of fantastic shapes. It lends itself most readily to decorative treatment; ribbons are not as a rule used alone, but are frequently employed as a supporting deco-

tifs of that period of French decoration. Ribbons and bow knots had been used for centuries in decoration, but always with a certain attempted dignity. The Louis XVI ribbons and bow knots do not try to be dignified, like all else in that style; they merely wish to be dainty and pretty and were given the appearance of motion as if a breeze shook the ribbon ends. The result is that these ribbon ornaments had a peculiarly crinkled, yet pleasing, appearance. While the ribbon has no particular symbolic significance, it possesses a certain decorative value as a design motif. Figs. 7 and 8, Plate 13.

The term "trophy" applies to the decorative grouping of various weapons used in warfare and in hunting. The grouping of such implements had its origin in the ancient custom of the Greeks and Romans of hanging on the trunks of trees the weapons of a vanquished foe. Eventually such tokens or trophies of victory were incorporated as decorative motifs in the art of the period. During the reign of Napoleon the use of everything symbolic of victorious war was carried to the extreme in the decorative art of the Empire. Flaming torches, eagles, stars, mythological signs, the helmet of Minerva, even the thunderbolts of Jupiter, were popular motifs, while the art of France during the Empire was based on a

we find, disregarding those of war and hunting, which come under the head of trophies, symbols of art, science, commerce, trade and the handicrafts. For example, Fig. 2 Plate 13 shows a grouping of the lyre, horn, laurel and palm as symbolical of success in vocal music, Fig. 3 Plate 13 symbol of the art of painting, the artist's palette, brush and mahlstick. Architecture might be symbolized by the square, compass and capital. Sculpture by the hammer and chisel. Instrumental music by the violin, flute and pan pipes. Sciences by the various tools and instruments used in their promotion. Commerce and trade is usually represented in a symbolic manner by the caduceus or Mercury's rod. This little symbol always



PLATE 14. THE APPLICATION OF ARTIFICIAL OBJECTS AS ELEMENTS OF DECORATION IN DESIGN.

1. Silver Trophy Cup. Incorporating in its Decoration Artificial Objects Such as the Auto Wheel, Totem Pole, Trophy and Symbol.
2. Bronze and Silver Cigar Jar. Conventional Norse Ship Used as Decorative Motif.
3. Silver Gilt Candlestick. French Style of 18th Century. Design Based on Architectural Lines. The Bow Knot, Drape, Torch and Quiver of Arrows Used as Decorative Motifs.

revival of the classic, but in truth it was a decorative glorification of the military prowess of its Emperor. In modern art the use of the trophy as a decorative motif is more or less limited to the decoration of military memorials, and armories, in art metal work to prizes dedicated to military use. Fig. 7 Plate 13 is a characteristic trophy motif from the French Empire. Fig. 4 represents a trophy formed of a shield and hunting weapons of the primitive races.

DESIGN OF SYMBOLS

The grouping of tools and instruments to symbolize some special idea leads to the design of Symbols; thus

seems to arouse a great curiosity on the part of the casual observer as to its meaning. In form the caduceus is a wand or staff entwined with two serpents and surmounted by two wings, the rod symbolizes power, the serpent's wisdom and the wings diligence and activity. According to mythology its bearer, Mercury to the Romans and Hermes to the Greeks, presided over commerce and trade. Hence the use of this staff as its symbol, an old fable tells us that Mercury received his caduceus from Apollo in exchange for the lyre, a musical instrument of his own invention.

Another decorative motif of symbolic character is the

cornucopia or "Horn of Plenty." This highly ornamental symbol of abundance and prosperity forms an important decorative motif in the Roman, Pompeian and various phases of the Renaissance periods. It originated in the ancient custom of filling an animal's horn, usually that of a goat or ram, with fruit or flowers as an offering of thanksgiving to the gods for a year of plentiful harvests. In decorative treatment the cornucopia has been so conventionalized in form that we can feel safe in claiming it as an artificial object. The cornucopia, too, has a fabled origin. Jupiter at his birth was committed by his mother Rhea to the care of the daughters of Melisseus, a Cretan king, and they fed the infant deity with milk of the goat Amalthea. Jupiter broke off one of its horns and endowed it with the wonderful power of becoming filled with whatever the possessor might wish; thus it was called the "Horn of Plenty."

The flaming torch is usually associated in our minds as the trade mark of anarchy, but in decorative art its significance is quite the reverse. It is the symbol of enlightenment and progress rather than destruction and chaos. It is used singly or in pairs, sometimes crossed

or as supports for festoons. With a bow and quiver of arrows it was often used as a decorative motif in the style of Louis XVI, Fig. 1, Plate 13; Fig. 3, Plate 14.

Of the many miscellaneous objects of decorative value in design those pertaining to the sea and its ships offer a wide range of artistic possibilities. A sailing vessel is one of the most picturesque creations of man and almost everything connected with the sea and a boat seem to lend themselves to decorative treatment. For instance, take a ship, its sails, its rigging and even its very movement when under way is suggestive of graceful lines and a blending of reality and mystery, for there is a strange suggestion of mystery about the sea that one cannot fathom. A bit of seaweed washed ashore, the fisherman's nets on their drying reels, a distant ship scudding before the breeze, its dim outline silhouetted against the gray blue sky, what a range of decorative inspiration they offer the designer. For example, Fig. 2, Plate 14, shows a design for a silver and bronze cigar jar, using as a decorative motif an old Viking ship of the Norse period under sail. The next paper of the series will deal with the human figure as a decorative motif in design.

A NEW LEAD PLATING SOLUTION.

By JOSEPH HAAS, JR.

The difficulty experienced with the deposition of lead from solutions of its salts is a powdery, and non-adherent deposit. If one concedes the probability that this may be due to the solutions being too easily decomposed, and therefore allowing the lead to precipitate out too rapidly to form a smooth, close-grained deposit, one can easily perceive the advantage of a solution that contains a salt not very greatly ionized, and therefore not allowing the lead to precipitate rapidly upon the cathode.

The lead acetate bath, even with its latest improvements, does not yield satisfactory results in the long run. The lead fluosilicate and the lead fluoborate baths, both of which are good baths for refining of lead, where the character of the deposit is not so essential, do not yield a satisfactory deposit for plating purposes. The lead perchlorate solution, the most satisfactory of all solutions, to-day is an impossible solution, due to either the difficulty in obtaining the materials or to their high cost. Consequently, it was decided to try a lead cyanide bath. Lead cyanide is a salt mentioned in "Van Nostrand's Chemical Manual" (1913), as being but slightly soluble in cold water, but soluble in hot water. To see what results could be obtained, the first experiments performed, were only on a two (2) gallon solution.

Five (5) ounces of lead were dissolved in nitric acid; excess of nitric acid driven off on a sand bath, and the salt dissolved in water. To the lead nitrate solution was added a solution of sodium cyanide to just precipitate the lead cyanide ($\text{Pb}(\text{CN})_2$). The precipitate was allowed to settle and the water siphoned off. The lead cyanide ($\text{Pb}(\text{CN})_2$) was then added to two (2) gallons of water and boiled. But, contrary to expectations, the lead cyanide ($\text{Pb}(\text{CN})_2$) was not completely soluble in the hot water. The undissolved lead cyanide ($\text{Pb}(\text{CN})_2$) was allowed to settle, and the solution electrolyzed. After 4 hours plating the deposit was smooth, white and bright. Subsequent trials gave the same results. Trials as to voltage and current density, limited the applied voltage to 1-1.75 and the maximum current density to 4 amperes to the square foot. The temperature at the outset of the electrolysis was 70 Degrees Centigrade, and at the finish it had

fallen to 30. Most naturally, the amperage fell also, but the applied voltage was kept at 1.75. Also, it was noted that the anodes coated heavily white.

It was decided to maintain the solution constantly at 60-70 degrees Centigrade. To do this the solution was siphoned off and the undissolved lead cyanide ($\text{Pb}(\text{CN})_2$) placed in a heavy muslin bag and suspended in the solution and the solution kept heated on a gas stove. Also 6 ounces of Rochelle Salts to the gallon were added. The results obtained were that the current strength was maintained constant; that the anodes were kept clean; the same deposit obtained as heretofore mentioned. The articles plated were polished brass, polished steel, and rough gray cast iron. Upon placing the articles into the solution, they received a deposit of lead by simple immersion, but as this in no way affected the adherency of the deposited lead, no attention was paid to this matter. Subsequently a larger solution was made up of 50 gallons, and worked hot. The solution was made up in the following manner. Six ounces of Rochelle Salts to the gallon, and lead cyanide ($\text{Pb}(\text{CN})_2$) in bags suspended in the solution continually from the sides of the solution. Results obtained were as satisfactory as those obtained experimentally. The solution must be stirred occasionally to bring the lead ion to the cathode area. By giving the solution a good boiling in the evening before leaving, no danger will be experienced in lead cyanide ($\text{Pb}(\text{CN})_2$) settling out on cooling, as the solution will be quite warm the next morning.

HOW TO FIGURE METAL COATINGS

For the determination of zinc on galvanized iron prepare a number of samples that are exactly 2 inches square, if possible, then immerse them one at a time in 200 cc. of concentrated hydrochloric acid for just one minutes. After removing from the acid wash in hot water, then in cold water, dry in sawdust, brush and weigh. The loss is zinc coating. Divide this by the number of pieces and multiply by 1.27, which will give ounces per square foot. If a small amount of iron is dissolved it will usually be so slight that it can be neglected but it may be precipitated by ammonia hydrate, determined as oxide and deducted from the weight of the zinc.—J. L. J.

CASTING NICKEL-SILVER, A COPPER NICKEL-ZINC ALLOY

SOME PRACTICAL INFORMATION FOR THE METAL MIXER.

WRITTEN FOR THE METAL INDUSTRY BY R. V. HUTCHINSON, STERLING SALES COMPANY, AUBURN, IND.

Nickel-silver, properly alloyed, is non-corrosive and non-erosive, resists commercial acids, and does not tarnish. It can be cast, rolled, and spun, and though stronger and tougher, machines about the same as brass. The possession of these valuable properties is the cause for the ever increasing demand for this mixed metal. To date most of the nickel-silver used has been in the form of sheet and wire, although a good amount has been cast, especially into parts which are to take a high polish and articles which are to resist certain chemical influences.

There are different reasons why this alloy has not been cast to a greater extent in the past, chief of which, though, is that foundry men have fallen down on their part. They have tried to handle this metal in the same manner they do brass and bronze and the result has been miss-runs, core-blows, kick-offs, sponginess, and other mishaps too numerous to mention.

Foundry men, as a rule, are set in their ways. They excuse themselves by telling you that metal is freakish. But metal is not freakish. It will do just what they make it do. If castings do not run, there is a reason. If castings are dirty, there is a reason. If a foundry

foundry in the middle west, probably the largest in America confining its casting to alloys with very high nickel contents, runs day in and day out with an average loss of two to three per cent.

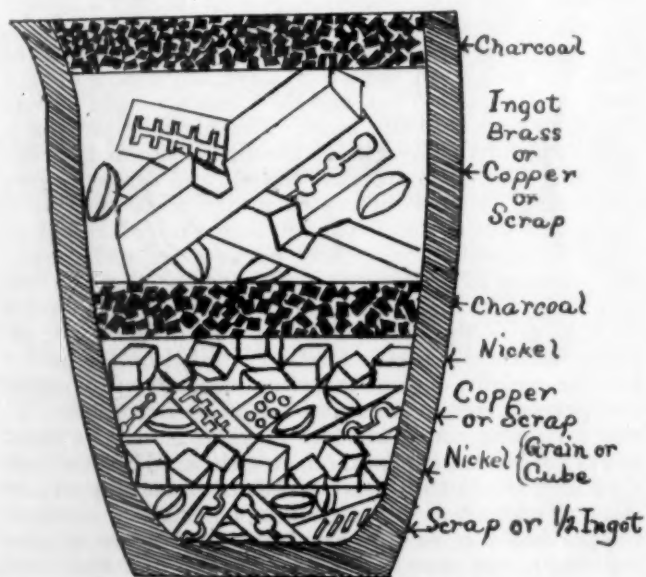
Up to the present time nickel-silver has been melted entirely in the crucible. But the very inferior quality of pots and fire-brick and the extremely high cost of each, coupled with the scarcity of furnace-tenders, are causing foundry men to find other means of melting it. The tilting, open-flame oil furnace is proving successful on certain kinds of work, where the zinc contents are very low, but the most promising probably is the electric furnace of the induction type. This furnace has a limited lead capacity, but when more than three per cent is necessary, the condition can be met by putting the lead in the pouring ladle and charging only so much scrap as to bring the total mass no higher than this amount. But the crucible furnace is the only tried and true way of melting nickel-silver up to this time, so we will not discuss other methods further.

MELTING.

As this alloy requires a very high temperature for its fusion, the coke furnace with a forced draft is best to use. A preliminary mixture of nickel and copper is unnecessary, but it is important that the crucible be packed properly. Fifteen or twenty pounds of scrap or a half of a copper or brass ingot should be placed in the bottom, making a nice bath which will aid considerably in dissolving the nickel. The nickel and copper should follow, but all the nickel should be in the lower half of the pot, where the most intense heat is, and where there is less danger to the nickel, which has a strong affinity for oxygen and occluded gases. The nickel should be covered with charcoal and an abundance should also be used while the pot is running down. The following diagram will illustrate one of the best ways to pack a pot for this alloy. The metal should not be stirred up while in a mushy state. It is bad to do this with brass or bronze, but even more dangerous with nickel-silver. The metal should be gently tapped with a bar settling with its own weight into the bath beneath. A brisk, steady fire must be kept up and it is best to add a little coke every fifteen minutes or so and not to let the coke burn away, and then throw in five or six shovelfuls at one time, for this alloy chills easily and every set-back of this kind may mean ten or fifteen minutes in getting the pot out. Nickel-silver should be ready to pour in two and one-half or three hours from the time the heat is started. After the metal comes to a liquid and does not cling to an iron bar, it is ready for the zinc and after the zinc is put in it should be well stirred, and brought to a very high heat. Five per cent of the zinc contents should be added for evaporation to keep the alloy to the formula. The lead should be put in just before pouring when the metal should be stirred again.

GATING AND POURING.

Pressure is a very important thing in casting nickel-silver and for this reason proper gating is most essential. On pages 495-6-7 of the November, 1918, issue of THE METAL INDUSTRY is an article which goes into gating in detail, and nothing further will be said here only that the gates should be large enough for the metal to get to the mold quickly. The metal should be poured hard and steadily. And let-up is bad and usually when a second pour is made the result is detectable on the castings.



METHOD OF PACKING A CRUCIBLE WITH NICKEL-SILVER.

does good work one day, it should do good work every day. But this is far from being the case. This trouble is often due to lack of knowledge and sometimes to carelessness, but generally to a certain amount of each. The truth of the matter is that the average man falls down on his tonnage even on brass and bronze. He loses from fifteen to twenty-five per cent of his castings when his loss at the worst should not exceed five per cent. And if this is the best he can do with these alloys, and mixtures he has been familiar with for years, it quickly explains why he throws up his hands on the mere mentioning of nickel-silver. But this "close your eyes and trust in God" way of running a foundry will some day end. Competition is getting keener and keener, and the time is not far distant when the man who is losing more than five per cent of his castings will also be losing a considerable amount of business. But nickel-silver is cast successfully by some foundry men. One

SAND AND CORES.

The condition of the sand is very important. It must be tempered just so and not shoveled up like gravel or cement. It must not be at all wet, for nickel-silver, being very sensitive, will not lay against it and a kick-off or miss-run is sure to be the result. Then on the other hand, it must not be too dry, for as said before, this alloy must be poured under greater pressure than other non-ferrous mixtures and if the sand washes, the result is dirty castings.

The core, where one is used, should be a fair break-down core which will give way to the metal on contraction. A damp core acts the same as wet sand, and unless the core is well dried, blows will be plentiful.

"De-Leading" A Galvanizing Bath.

By H. PROCTER SMITH, F.C.S., M.INST. C.E.

The method of removing the excess of lead from a galvanizing bath as practiced in some of the British galvanizing works may be of interest.

It consists in placing a heavy cast-iron pipe in the lowest portion, or if level, about the center of the bath, and

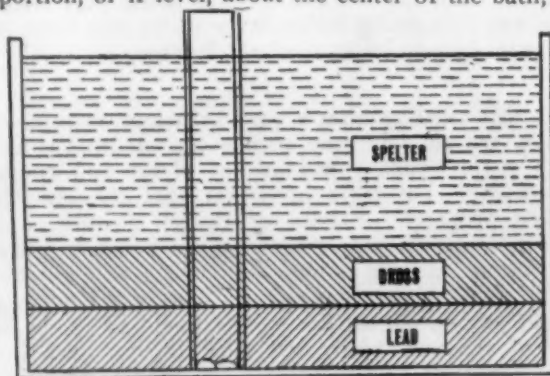


FIG. 1. INSERTING A PIPE TO REMOVE LEAD FROM A GALVANIZING BATH.

with a hand ladle smaller than the diameter of the pipe, removing successive quantities of the spelter and dross from the pipe, and pouring back into the galvanizing bath, outside the pipe, until gradually the lead is forced to the top by the weight of metal outside. The lead may then be removed in the same manner and cast direct into moulds. By this means it is possible to effect very complete removal of the lead with the minimum of trouble.

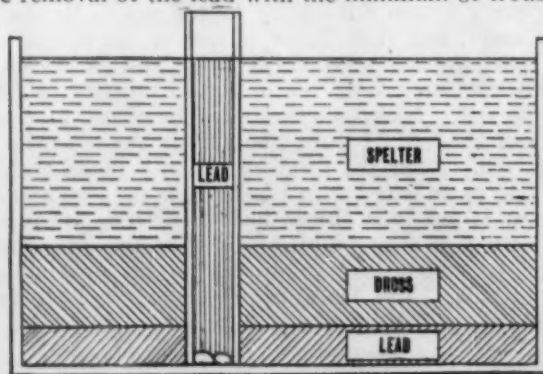


FIG. 2. SHOWING HOW THE LEAD RISES IN THE PIPE.

The two sketches show sections of the bath, Fig. 1, when the pipe has been placed in position before commencing to "de-lead," and Fig. 2 after all the spelter and dross has been removed from the pipe and the lead ready for removal. If necessary, holes may be drilled in the bottom of the iron pipe to allow the metal to enter as

MOLDING

One should not ram nickel-silver molds as hard as he usually does brass molds, and should vent more. As a rule too little attention is paid to venting, which would save many castings in both the iron and non-ferrous foundries. The cope should be rammed just hard enough to be secure, and the drag hard enough to prevent swells. The cope should be freely vented, and a vent taken off of each core so that the gases can get away as quickly as possible.

Nickel-silver can be cast as readily as brass only it must be handled a little differently. Proper care in melting, good, steady pouring, and most important of all, proper gating, and the results will be very satisfactory.

quantities are ladled from the top.

SAMPLING BRASS ASHES.

To sample a parcel of brass ashes is by no means easy. While the ashes are being loaded into trucks or carts, a small shovelful is taken out of each barrow and put on one side. The sample so obtained is thoroughly mixed and quartered down until from 2 to 10 hundred weight, according to the size of the parcel, is obtained. This sample is then ground up in a clean mortar mill or on a sampling plate with a heavy hammer. It is well mixed up and 1 pound dried to determine moisture. About 7 pounds is dried, then 5 pounds of the dry material weighed on a rough scale; this is then crushed up until every particle except the metallics will go through a 30 sieve, any pieces of zinc, lead, or iron picked out, and their exact weight of pure dry sand added to the fines. The metallic portion is weighed and the weight of the fines obtained by difference. The fines are well mixed; and three packets, containing about 4 ounces each, are made up; inside these are put a small packet made up of chippings from the metallics; the three packets are sealed up in the presence of the buyer's and seller's representatives, and each takes one packet and assays it; if their assays do not agree, the reserve packet goes to a referee assayer, whose decision is final. The label on the packet has the weight, date of sampling, amount of moisture, and percentages of fines and metallics written on. All mill sweepings and such like residues should be burnt to get rid of waste, paper, oil, etc., then riddled through a 1/2 inch riddle to remove pieces of brass, copper and iron. The fine material can then be easily sampled. Copper scale is easily sampled: in all cases a good representative sample should be taken and quartered down. If a number of bags are being sampled a small handful must be taken out of each bag. Two to five grammes of the fines are taken and dissolved in nitric acid, diluted and filtered. Copper is "thrown down by sulphuretted hydrogen gas, the copper sulphide precipitates filtered off, dissolved in HN 3 after washing, and the copper determined either by the iodine method or the electrolytic method. The sample may be assayed for other metals by the usual methods given in text books (see "Analysis of Ashes and Alloys," by L. Parry).

Instead of assaying the sample as described, 1 pound may be taken after passing through a 30 sieve and fused with charcoal and fluxes, e.g., soda-ash, fluorspar, lime and borax in a clay crucible. The reduced metal forms a button of crucible, leaving a clean slag. The button is detached when the pot has cooled and weighed and then assayed for copper. This method is suitable when only the copper percentage is required.—H. W. C.

REVIEW OF THE PLATING INDUSTRY FOR 1918

A DESCRIPTION OF SOME OF THE MORE IMPORTANT ACHIEVEMENTS OF THE TRADE.

WRITTEN FOR THE METAL INDUSTRY BY CHARLES H. PROCTOR, PLATING EDITOR.

One of the most momentous years, perhaps in all history, came to a close at the last stroke of twelve at midnight, December 31, and 1918 had passed on into oblivion, into the great past from which bourne no traveller ever returns. When the year 1917 had closed forever and 1918 came upon the war-tired world, no living being could say absolutely that before the dawn of another year the greatest war in all history would be brought to a close and that another page would be written that would change the destiny of the great nations.

The final chapters of a year so fraught with sorrow have been closed and we now turn to the newer pages of a more glorious future with a living memory for the noble cause for which our fathers, sons and brothers gave up their lives in the supreme sacrifice, that Liberty and Democracy should be triumphant and to preserve for future generations this priceless treasure. Therefore, let us all remember that courage and patriotism will endure forever and that in giving up their lives their one thought was that autocracy should be crushed nevermore to rise again.

In bringing the great war to a successful issue the American electro-platers, as well as the platers of our Allies, have played no small part in this accomplishment, so we give our thanks to all. The past year in the plating industry might be correctly termed a "Military and Naval" year, because the greatest effort was put forth by the American electro-platers in the interest of these branches of our fighting forces. These two branches also cover the air forces which has also proved to be a very important proposition so far as the plating industry is concerned.

The latter part of 1918 might be aptly termed the "Zinc Age in Electro-Plating" and if the war had continued another year it would doubtless have reached tremendous proportions, because the deposition of zinc had become the deposit par excellence for articles of iron and steel that must be protected from corrosion and consequent disintegration due to atmospheric and other destroying influences. I noticed during my extensive travels that in every plant where Government contracts were being filled that zinc plating was being done on every hand. It is almost impossible to enumerate the thousand and one things that were being zinc plated. I saw floating buoys made from steel and about four feet or more in diameter being zinc plated, not in separate parts, but as a whole. Platers will understand how difficult it was to clean and plate these buoys when one considers the amount of displacement that occurred and the heavy weight required to keep them beneath the surface of the solution so that a satisfactory contact could be made and sufficient zinc deposited to withstand the Government test.

This is only one of the hundred problems that had to be solved by the plater. Shells of various sizes and shapes had to be plated with zinc to prevent corrosion, depth bombs were plated in parts, hospital and field equipment of endless variety was also plated with zinc, so the metal became a dominant factor in the plating industry. Previous to the conference on the plating of



CHARLES H. PROCTOR.

military supplies at the Bureau of Standards, March 27, 1918, at which time the representatives of the military authorities, the Bureau of Standards and the American Electro-Platers' Society decided by consensus of opinion that zinc was the metal that would give the most satisfactory protection to steel or iron, there was no set standard. The naval authorities, however, had prescribed zinc plating for protective purposes. The army authorities followed the specifications of the European nations who did not specify any particular finish, but one that would give an added protection to the steel or iron. So it was found that nickel, copper, brass and tin plating, also Parkerizing and phosphorizing were specified and in many instances lacquering was called for, so that manufacturers were in a quandary sometimes and did not know what finish they were supposed to apply.

A Government inspector, who had visited a plant where they were doing tin plating on a booster shell socket according to specifications found in another plant that the specifications required the lacquering of these same booster shell sockets. I found in some instances that articles made of solid copper had to be copper plated because the specifications called for copper plating. This is only one of many absurd specifications that the manufacturer had to contend with.

Happily, however, through the efforts of W. G. Stratton, Director of the Bureau of Standards, Washington, D. C., and one of his able assistants, whom every member of the American Electro-Platers' Society knows—Dr. Blum—order came out of chaos following the conference in March and two eminent members of the society were employed, Messrs. Hogaboom and Liscomb, to give the manufacturers advice and the Bureau of Standards assistance along the practical lines of production rather than along technical lines. These men worked hard and faithfully for America's cause and have earned the thanks of the Society, as Dr. Blum aptly remarked in an address at the banquet of the Providence (R. I.) Branch of the American Electro Platers' Society on Saturday evening, December 7, 1918.

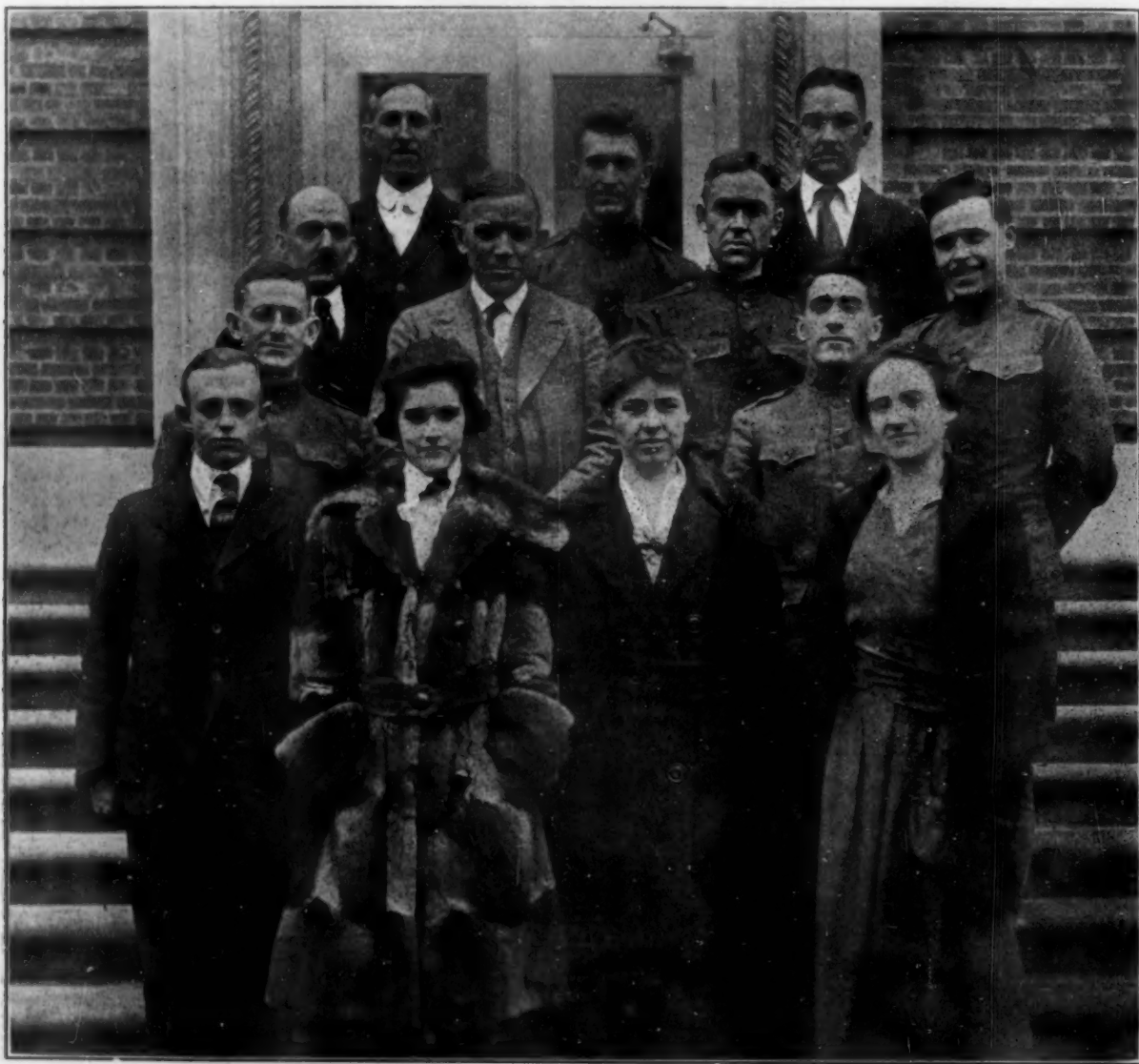
It cannot be said that any great progress has been made in the art of plating by the Bureau of Standards or through the employment of the men mentioned above. Time was the important factor and endless production in a specified time was also a great help. So the efforts put forth were on the basis of production and assistance in improving methods and much valuable assistance was rendered by Messrs. Hogaboom and Liscomb in helping manufacturers, who had never previously required any plating equipment, in the proposition of zinc plating. By November first practically all the finishes such as brass, copper, etc., had been discontinued for protective purposes on iron and steel and zinc was the leading deposits.

Deposits of zinc have been produced from both the acid and alkaline solutions, but the alkaline or cyanide zinc solution was found to be the best in zinc plating Government products. This was due in part to the greater conductivity of this type of solution, the more even distribution of the metal and the greater amount of metal that

could be deposited in a given time. All of these qualifications were very important when applied to the one word—production.

Due to the knowledge that has been gained in the deposition of zinc and its valuable properties as an anti-corrosive agent, there is no doubt but that it will be used more extensively than heretofore in the commercial industry for the production of hardware, etc. Zinc could be used especially for outdoor purposes in builders' hardware, as it could be used as a useful and decorative finish,

who knew different is beyond my comprehension. Has the American Electro Platers' Society accomplished nothing for the cause? Why not have called it an American formula? Even if the proportions of the various chemicals had been increased three or four times over those of the original formula, its component parts had not been changed in the least. The chemicals used in the original formula had not been changed one bit and the solution in its increased proportions is not as effective as a solution containing 50 per cent of the weights in this



ELECTRO-PLATING STAFF, DIVISION V, SECTION 2, CHEMISTRY, BUREAU OF STANDARDS, WASHINGTON, D. C.
Top Row—Dr. W. Blum, E. G. Reid, L. M. Ritchie. Second Row—George B. Hogaboom, F. J. Liscomb, W. E. Bailey, Thomas Slattery.
Third Row—E. B. Ham, A. Frieden. Bottom Row—A. D. Bell, Miss H. A. Nixon, Miss E. Z. Jencks, Miss H. Hester.

either in polished or brushed effects, which have been so prevalent in brass and copper in the past years.

Within a few months of the signing of the armistice a formula for zinc plating was being given out by representatives of the Bureau of Standards, which was termed the "French formula." The formula was of the cyanide type and in fact the proportions were based upon the original formula given out by the writer at the annual convention held by the American Electro Platers' Society in Cleveland, Ohio, in July, 1916. Why this formula was termed the "French Formula" and given out by men

so-called "French Formula." The original formula was printed in the English edition of *THE METAL INDUSTRY** for August, 1916, copies of which were probably sent to France and the formula then came over to the United States in its new garb of increased proportions, but it still remains an American formula and so it will always be.

It is to the future that the American electro-plater must look forward to and not the past. The restrictions in the use of the commercial and previous metals, such as platinum, gold and silver, had a depressing effect on

*Reprinted from the American edition, January, 1916.

the various products manufactured from these metals, but the ban is now lifted and manufacturers will devote their efforts to a greater production than ever during the coming year and apparently there will be plenty of business for all and in all lines. A week or two ago a Providence manufacturing jeweler informed the writer that his spring orders were three times as large as in the past three years and wherever I have been during the past two months everyone is of the opinion that there will be a great deal of business. In every line of industry in the middle west manufacturers are optimistic and they anticipate all the business they can take care of. The recent reduction in the price of steel, though but little, has been the basis of the placing of large orders for domestic goods and there is an understanding between the steel manufacturers that equitable prices will be maintained and then there will be no danger of a slump in prices.

Keep up your prices, keep up your wages and keep up your production, don't be a pessimist, and then gradually we shall come through the spirit of unrest and the American manufacturer will find himself upon a more substantial basis than ever. We must keep in mind that the trade of the world is goods for goods and we all depend upon the thousand one things that must be produced as essential in every day life. If there is no demand there does not need to be any supply. Keep your demand on the hundred per cent basis and keep the wheels turning to their fullest capacity. With ample labor in sight for all purposes, the future years should be the greatest in our history, even in the face of the probable world competition.

I have already mentioned that there was nothing of very great importance developed in 1918. However, there was one important thing and that was the nickel plating on wax matrices. I have been unable to obtain all the facts, but as I understand it, deposits of nickel may be made up to one inch in thickness. By this new process the deposit is ductile and malleable, proving that the inventor of the process has been able to eliminate the one great detrimental factor in unusually heavy deposits of nickel, the occlusion of hydrogen. There are great possibilities if such a process has been developed so that it can be used on a commercial scale and with the rapidity that is claimed for it, it means that if the same principles involved can be applied to other metals deposited for commercial purposes that it will revolutionize the rapidity of depositing metals.

I understand that patents have been applied for for the method and that the Government has had free use of the invention during the war period. Personally I have not seen any samples produced by this method and have given this information as I have received it, unofficially. But if the facts are as stated then an important step has been made in the plating industry.

In reverting to a peace basis it is anticipated that the Bureau of Standards will be able to carry out the proposed experiments in an effort to produce formulas of a standardized type, with standardized methods of electric control and replenishing. If the gentlemen who have been employed by the Bureau of Standards for their practical assistance could be retained, then we could anticipate that much would be accomplished of a practical nature that would be of a substantial benefit to the entire industry.

With the discontinuance of military finishes in the jewelry line, the manufacturers have reverted back to the various gold colors, such as rose, green, English and polished karat finishes. Platinum plating is being used to some extent upon gold articles to give a platinum finish. White gold is not as prevalent as a year ago. Platinum will possibly be used more extensively than ever the

coming year due to its intrinsic value and its great resistance to wear and oxidizing influences. The various salts emanating from the human system oxidize and corrode even gold, but platinum is unacted upon and there lies its value, even from a sanitary standpoint.

In the building hardware line there is nothing new to relate due to the fact that the demand for the line has been very small owing to practically no building operations and the restrictions placed upon raw materials, but the coming year should be one of the greatest in the history of the manufacturers of builders' hardware. The markets are practically depleted of goods so that domestic and export trade will be extensive. The finishes on the higher grade of hardware will probably be of gold and silver, while in the commercial grade oxidized and verde finishes; also the brush finishes in copper, brass and bronze and as mentioned zinc deposits should be in demand. The use of steel in this line should provide an unusual demand for plated finishes.

In the fixture trade every variety of finish still prevails, with all sorts of fancy trade names. The applied enamels and lacquers have enabled the plater or lacquerer to produce an endless variety of finishes with as endless a procession of antique names. Polychrome is still in great demand and the finish used upon a variety of lamps, book rests, bric-a-brac, statuary and imitation Oriental metal products of the galvanoplastic type. That is copper deposited upon a composition of plaster of paris, first by metallizing and then by electro-plating in acid copper solutions, the final finishes being in bronze, silver, gold or the polychrome finish, which consists of almost any available color applied either by spraying or by means of the brush.

In the chemical line there is nothing really new to relate, the prices of chemicals still remain high though they have a slight downward tendency but nothing alarming will occur so it is advisable to buy to cover prospective requirements, otherwise when everyone starts to buy all at one time the prices will go up. Supply and demand still governs all commodities so be advised accordingly.

In closing, let us all pull together with a long pull and a strong pull and the success of American industry and commercial enterprises is assured.

BLACK NICKEL SOLUTIONS.

A good black nickel solution should consist of the following:

Double nickel salts	8 ozs.
Single nickel salts	1 oz.
Ammonium sulpho-cyanide	2 ozs.
Sulphate of zinc	1 oz.
Water	1 gal.

Use a voltage not exceeding $\frac{1}{2}$ to $\frac{3}{4}$. The slower the deposit is obtained the blacker the color.

In preparing the solution all that is necessary is to add a small amount of the ammonium sulpho-cyanide and zinc when the color is brownish or iridescent. A few drops of ammonia may be added when the black color becomes grayish.—C. H. P.

The following formula for black nickel solution gives excellent results provided the voltage used is sufficiently low, which should not exceed from $\frac{1}{2}$ to 1 volt with amperage in proportion to the surface immersed:

Water	1 gallon
Double nickel salts	6 ounces
Ammonium sulpho cyanide	2 ounces
Sulphate of zinc	1 ounce

Use anode of cast nickel and a low voltage, as above mentioned.—C. H. P.

AUTOMATIC COPPER PLATING

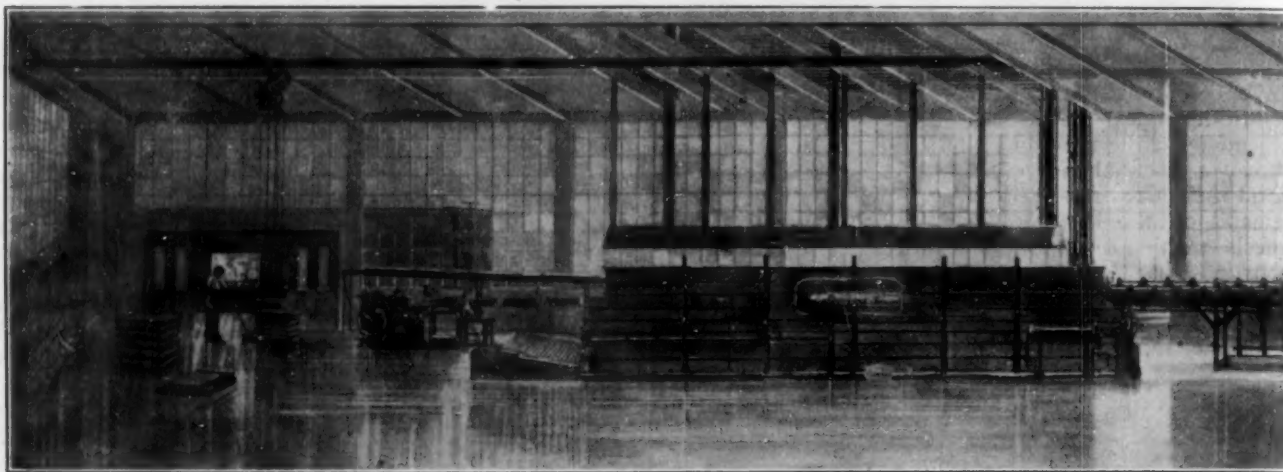
A PAPER TO BE PRESENTED AT THE NEW YORK MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS,
FEBRUARY, 1919.

By JOSEPH W. RICHARDS,* SOUTH BETHLEHEM, PA.

Plating iron with copper has received great attention from practical and scientific men, but, aside from the deposit secured by immersion of iron in copper salts, by electro-plating, or by welding together thin sheets of iron and copper these efforts have met with no success.

Failure of these efforts, in the production of copper plating, has been due to the fact that the conditions normally and necessarily present in the plating operation are antagonistic to the production of copper-plated iron. In most, if not quite all of them, a bath of molten copper has been used. The temperature of a molten copper

I recently had the pleasure of visiting the works of The Metals Plating Company, at North Elizabeth, N. J., where I witnessed the plating of iron sheets with copper by a new process.¹ The plating metal is applied to the sheet in the form of a liquid mixture by means of rolls, such as inking rolls. The sheet, after being coated with the mixture, is automatically carried forward and deposited on a link-belt conveyor, which carries it through a furnace maintained at a temperature well above that of molten copper. The basic principle involved in this method lies in the application of the plating metal to



AN AUTOMATIC FEEDING AND PLATING MACHINE USED IN COPPER PLATING STEEL SHEETS

bath is so high that the iron becomes oxidized before it can be immersed in the molten copper, and unless a protective flux for the molten copper is used, the sur-

face of the copper will become oxidized, and, in any event, the plated iron will oxidize immediately on its being withdrawn from the molten bath.

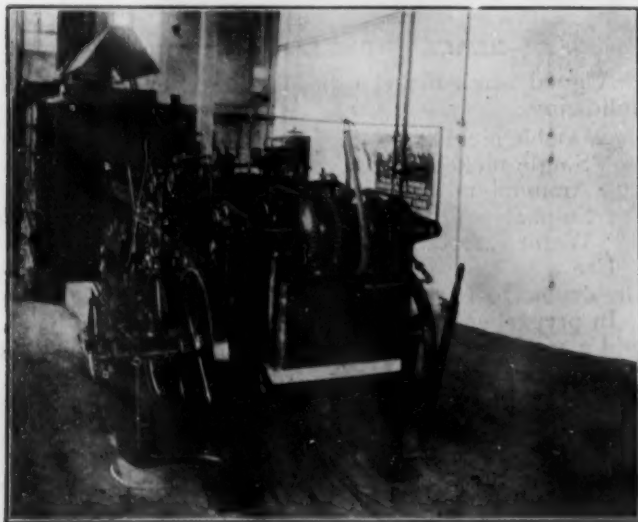


FIG. 1. THE SHEET-FEEDING MACHINE AND COATING ROLLS.

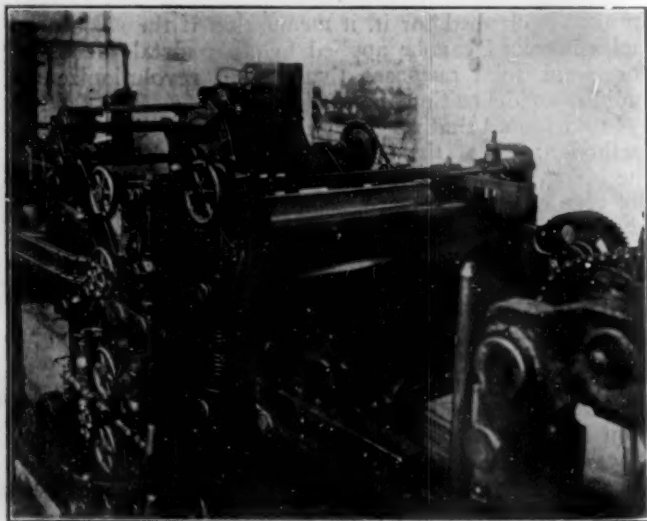


FIG. 2. THE COATING ROLLS, SHOWING PARALLEL ADJUSTING GEARS.

face of the copper will become oxidized, and, in any event, the plated iron will oxidize immediately on its being withdrawn from the molten bath.

* Professor of Metallurgy, Lehigh University.

THE PLATING MIXTURE.

The liquid plating mixture is composed of either

¹ U. S. Patents 1197693, 1197694, 1197695, September 12, 1916, to William E. Watkins.

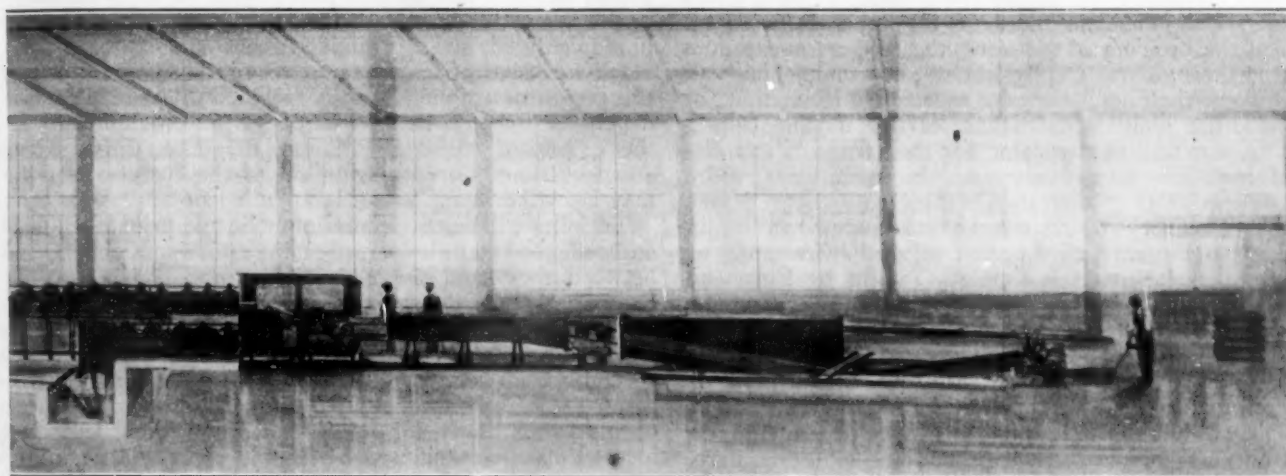
copper oxide or finely divided copper, or a mixture of both, ground to the consistency of a light varnish in a crude oil having an asphaltic base, of a specific gravity of from 14° to 16° Baumé. The plating mixture which gives the best results consists of 4 pound (1.8 kg.) of copper oxide ground together with 4 pound of finely precipitated copper, and made to the consistency of a light varnish by grinding it in 1 gallon (3.81.) of Mexican crude oil of specific gravity of 14° to 16° Baumé. It is found that the asphaltic base of this oil has reducing power sufficient to reduce the oxide of copper to metal, in the furnace, and to protect the precipitated copper from oxidation during the operation; also to reduce any oxide of iron that may have been on the sheet.

This mixture has also been found to have the proper viscosity for its application to the sheet by coating or

only without any copper compound. Mexican crude oil is probably the cheapest liquid to use, suitable for this purpose, but other liquids of similar properties have been used with nearly equivalent results.

THE AUTOMATIC FEEDING AND PLATING MACHINE.

As the boxes of sheets are placed on the platform of the machine, it is necessary to lift the sheets one by one and feed them, like feeding paper to a printing press. This can be done by hand but has been accomplished very satisfactorily by an automatic sheet-feeding machine which has been worked out by Mr. Conran, the company's superintendent. The platform on which the stack of sheets is placed is raised continually so that the top sheet is always at the same level. A suction cup comes into contact with the upper sheet and lifts it, while at the same moment a jet of compressed air



AT THE PLANT OF THE METALS PLATING COMPANY, NORTH ELIZABETH, N. J.

inking rolls, and to hold it uniformly on the sheet when exposed to the furnace temperature so as to produce a uniform deposition of strongly adherent copper upon

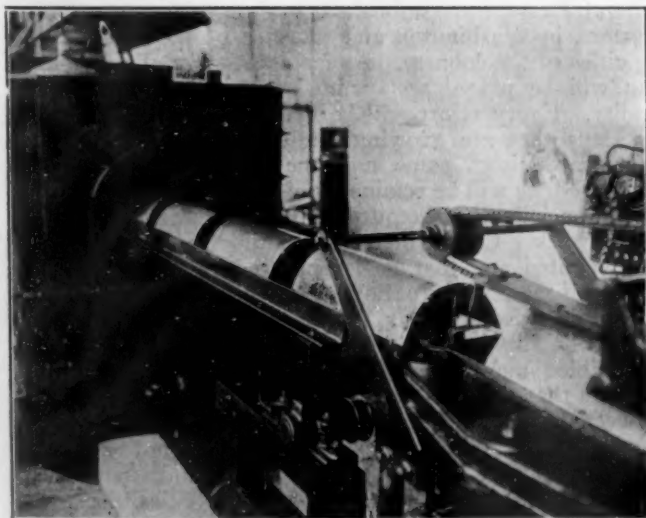


FIG. 3. THE SHEET-ARCHING MACHINE AND FURNACE CONVEYORS SHOWING BOWED SHEETS ON THEIR SUPPORTS ENTERING THE FURNACE.

the sheet. A number of variations of this mixture have been used, such as using copper oxide only, mixed with powdered charcoal, or using precipitated copper

is introduced beneath the sheet to destroy the vacuum effect, or any other slight adherence between the sheets, thus freeing it from the sheet beneath. The suction cup raises the rear end of the sheet and forwards it into engagement with coating rolls to receive the plating mixture. The sheet then travels forward and is deposited on the furnace conveyor, lateral fingers compressing the sheet into an arch, so that it passes into the furnace bowed, in a position and shape best suited for withstanding collapse when exposed to the heat existing in the furnace.

Parts of the carrier, such as the fingers that support the sheet, that are exposed to the greatest heat of the flame, are cast of nichrome metal, in order that they may withstand the temperature and the oxidizing influences of the flame.

While being carried through the furnace, volatile constituents of the paint upon the sheets distill, copper oxide in it is reduced to metal, and the copper unites with the iron to form a continuous coating. The atmosphere of the furnace is kept reducing in order to preserve the coating as far as possible from oxidation. The carrier delivers the sheets to flattening rolls, which pass them on to another carrier operating at lower temperature, upon which they cool.

Articles of other shapes than sheets, such as wire and tubes, can likewise be copper plated on the same principle and by the use of similar continuous automatic apparatus. Other metals as well as copper, such as tin, lead, and alloys of different metals, can also be used as the plating metal.

USE OF CRIPPLES IN INDUSTRY

A PAPER TO BE PRESENTED AT THE NEW YORK MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS, FEBRUARY, 1919

BY JAMES P. MUNROE,[†] WASHINGTON, D. C.

Appalling as has been the loss of life in the last 51 months, there is one slight compensation: no longer will there be in the world a cripple, in the old meaning of the term. Men handicapped by wounds or disease, there will be, unfortunately, and in numbers beyond what the world has known since the wars of Napoleon; but neither they nor the industries from which they were called off to war will be "crippled" in the sense in which both would have been had mankind not learned the lesson of conservation and come to understand that the most important field for such conservation is not in the forests and the mines but among men and women.

From the beginning of the Great War, France, Great Britain, Belgium, and most of the other Allies have studied the problem of restoring the soldiers and sailors injured through war to physical and economic efficiency; and from their experiences, especially from that of Canada, the United States has learned much. Consequently, our task of preparing for the return of our disabled men has been easier and, in some ways, more comprehensive than theirs. Complex as are the details of the machinery which the United States has set in motion to take care of the men injured by wounds or disease, the plan itself is simple. Taught by European experience, the Surgeon-General of the Army and the Bureau of Medicine and Surgery of the Navy have provided, on both sides of the Atlantic, every known surgical and medical facility for restoring the injured or diseased man to a physical condition as nearly normal as possible. While in the hospital in France or England, on the transport coming to America, and in the hospital here, the disabled man is incited in every way to believe in his future efficiency, to want to be a normal worker, to desire to retake his place in that society of workers from which he went, temporarily, to do the greater work of preserving civilization. Furthermore, since purposeful occupation is now regarded as an essential form of treatment with most men in the hospital, especially in the convalescing stage, many of these men will have been actually started on the road to earning before they are discharged from the army surgeon's care.

As soon as it is decided that a patient is ready for discharge from the hospital—and, now that hostilities have ceased, from the Army and Navy itself—his case is certified to two bodies: the War Risk Insurance Bureau, which is to determine the amount, if any, of his compensation under the War Risk Act, and the Federal Board for Vocational Education, which stands ready to help him to get back into employment and, if he needs it, to secure a preliminary training that will enable him to make the most of himself, under the conditions of his handicap, in that employment.

The Federal Board has no authority over the man thus placed under its care; it is for him to decide whether or not he wishes to avail himself of the help that the Federal Government thus offers. But if he chooses to use the facilities tendered by the Board, there is almost no limit, within reason, to what that organization may undertake for him. Its simplest task is, of course, to assist him in getting back into his old employment; but if he has ambition to get something better or if it is apparent that, by training, he can be more efficient in what he did before, the Board has authority to give him, at Government expense, as much education as, in its opinion, it is worth while for him to have. Every endeavor will be made

to train the disabled man so that not only may his handicap be overcome, but that he may be carried, through an education perhaps denied to him before going to war, to a plane of efficiency that, without this opportunity, he could not have reached. Experience in other countries has shown that, in many instances, the disabled man is, after training and despite his handicap, a much more effective man than he was before the war.

While the disabled soldier or sailor is under no compulsion to take training, there are certain incentives, besides that of ambition, which the Government puts before him. If he desires to be trained and the Federal Board believes that he will profit by it, he is so certified to the War Risk Insurance Bureau, which at once classes him as entitled, during training, to the compensation provided for cases of temporary total disability, and, during the period of training, makes specified allotments to his dependents, should he have them. If he does not pursue the course of training with due diligence, these extra compensations, on representation of the Federal Board, may be withdrawn.

Training will be carried on in public and private schools and colleges and in industrial plants under contracts made between them and the Federal Board. The period of training will be determined to meet the needs of each case, but in every instance the disabled man is to be regarded as a special problem and the instructional work given him will be fitted to his needs. It will be attempted, as far as possible, to obtain for him a position in advance of his being ready for it, so that his training may be focused upon a specific goal. Should it prove, after employment, that his choice was unwise, the Board has authority to give him further training along that, or some new line. Moreover, after placement, whether with or without training, the Board will keep closely in touch with the man until it feels certain that he is firmly established in his industrial, commercial or professional life.

To carry out the duty placed on it by Congress, the Federal Board has established, or is establishing, headquarters, in Washington and fourteen of the other leading cities of the country. As far as possible, the disabled man will be placed and trained in his own State and locality. Every effort will be made to put him into occupations that are growing, and so to train him that, when hard times come and the fervor of patriotism has passed, he will be retained, not because he is a former soldier or sailor but because he is a workman necessary to the work. Care will be taken, moreover, that he is not exploited and that he is not used as an instrument to disturb the labor situation. The complicated problems that might arise, in many States, in connection with employer's liability laws will not come up, since the number of disabled men is happily much less than it seemed probable that the United States would have.

The comparative smallness of the problem in the case of men injured in the pursuit of war serves but to emphasize the greatness of the number of men and women injured every year in the pursuit of the activities of peace. By the hundreds of thousands they meet with accident and injury in every degree and form. Heretofore, most of these injured persons have, so far as their economic usefulness is concerned, been thrown on the scrap-heap of society, with anguish to themselves and their relatives, with incalculable loss to the community. The war has taught us that this waste is needless and wrong; and if a bill now before the Congress becomes law, the Federal Board will be charged with providing relief.

[†]Vice-chairman, Federal Board of Vocational Education.

EFFICIENCY OF WORKMEN AND MACHINE EFFICIENCY

WRITTEN FOR THE METAL INDUSTRY BY WILLIAM F. HIRSCHMANN.

The subjects of "Efficiency of Workmen" and "Machine Efficiency" are so closely bound together that it is almost impossible to separate them, and in a short article such as this it is only possible to scratch the surface of this really great labor problem.

A good mechanic often will produce work from a poor machine, that is of excellent quality and quantity, while, vice versa, a poor workman will produce work from the best and most modern machine that will cause the foreman to shudder. Reversed, the good man on a good machine can accomplish wonders, while the combination of a poor workman and a poor machine is one to make angels weep. To use an old navy adage, it's the "man behind the gun" that counts. There are no men or machines 100 per cent efficient.

Even automatic machines are seldom more than 90 per cent efficient and often less than that.

How shall we arrive at a proper basis for computing a day's output for either man or machine? How shall we overcome or minimize the loss between what a man or machine CAN do and what he or the machine DOES do? If an automatic machine produces a piece of work in twenty seconds, it appears to be simple arithmetic to say that it should produce 1,800 pieces in a ten hours' run. But does it? Usually the amount is nearer to 1,500 pieces. Tools must be taken out and sharpened, stock must be fed, parts reset, screws tightened and numerous other details attended to, each insignificant in itself, but totaling up a considerable aggregate when the day is completed. This also applies to the man who is working day work.

Invariably the loss in handwork is greater than that of automatic machines, because so much depends upon the man's physical and mental conditions. If a man is physically fit, his mind will be naturally more alert than when he is unfit, and under such opposite conditions the disparity in output becomes very marked. The problem, then, is to establish a standard which can be considered the yardstick by which a day's work can be measured, and here again must we take into consideration the human element, for no two men are exactly alike in ability. This standard of measurement should be made in such a manner that the AVERAGE man may measure up to it, that the incompetent man automatically eliminates himself, and the exceptional man is provided for. This latter is important, since no man can do his best unless urged on by some incentive.

The piece work system, when fairly used, appeals to both employer and employee alike, because it establishes a definite status for both. So much work for so much money makes a positive understanding, the requirements and obligation of each are clearly defined, what is expected of them, and in consequence they can govern themselves accordingly.

This system, however, is capable of such improvement, principally in the direction of arriving at a proper rate, that is fair to both sides. If the piece price is a little better than it should be, the operator will usually fix a certain amount for his day's output (to protect his price) and thus curtail his production, while, on the other hand, if he makes more than the employer considers proper, the price is cut, and this at once creates a feeling of resentment on the part of the employee. When a piece work price has been set it should not be changed for a certain fixed period from the date on which it has been made, unless a change in machinery or tooling justifies such a

revision. If a piece rate is a little better than practice proves it should be the operator should be encouraged to go to the limit of his earning capacity without fear of a price reduction, for in this way the employer gains more in the reduction of overhead charges, per unit, than the excess piece price paid.

On a time or day rate basis, it would seem logical that some fixed amount should be specified as a day's work. As at present conducted in most factories there is nothing definite as to what should constitute a day's work. There is a great disparity in the output of different men and machines. Under existing labor conditions it is almost impossible to pick up men who can from the beginning produce the full quota of a day's work. They must, of course, be educated, but under the flexible conditions existing, a man's output is governed by himself practically, because if he applies himself continuously and diligently to his work, no foreman can find fault with him for loafing. With a definite fixed amount before him as his day's task, a man will adapt himself to the run of his work and adjust himself to a systematic time schedule, that is, he will if he is worth his salt. If a mechanic knows that a certain amount of work constitutes the average day's output he will strive to be a little above that average, if he is properly constructed, because deep down in every man's heart is the feeling that he is a little better than the average, and it is good psychology to appeal to his pride. It is at this point that consideration can be given to the bonus system as the necessary incentive.

If a man can produce above the average amount it is an excellent policy to offer him encouragement to do so. As overhead charges are usually a fixed amount for the day or hour, it naturally follows that every additional unit of work produced within the limits of the day or hour, even though paid for proportionately under a bonus system, must decrease the overhead charges per unit, and as these charges are usually double and even treble the labor cost, the employer profits proportionally with the employee.

Another matter to be considered is the mental attitude of the workman. If he knows he is earning a little more than he could earn elsewhere, he is not harassed by the discontent that is so destructive of that "morale" of the working force, a most important factor in obtaining the best results, but he will, on the contrary, strive to retain his advantage, and what is better for all concerned, endeavor to increase it. The employer also profits because of increased production, and in the better class of workmen drawn to his factory, attracted by the knowledge that the best wages in the trade are to be earned in that particular factory, and who, realizing that they are earning as much, if not more, than they can elsewhere, remain contentedly at work, thus minimizing the loss occasioned by a shifting and unstable working force. One of our famous statesmen once said while discussing the tariff on wool that "a cheap coat is cheap in name only"; this applies equally to a mechanic. If a workman has sufficient intelligence to become a good mechanic, he has also enough intelligence to expect to make more than a mere existence out of his skill.

An 80-cents-an-hour man who can produce a piece of work in one hour is a cheaper man than he who takes one and a half hours for the same piece, even though his rate be only 50 cents per hour.

ELECTRO-GALVANIZING BOOSTER CASES, ADAPTERS AND DETONATOR FUSE COMPONENTS FOR THE UNITED STATES GOVERNMENT

WRITTEN FOR THE METAL INDUSTRY BY T. C. EICHSTAEDT, SUPERINTENDENT OF THE GALVANIZING DEPARTMENT OF THE INTERNATIONAL ARMS & FUSE COMPANY, BLOOMFIELD, N. J.

The Mark III booster cases are approximately three inches long, one inch in diameter with a thread on the outside of the open end. These booster cases are electro-galvanized both inside and out and the threads must not be injured and the quantity wanted per day was 30,000. On the 21st of June, 1918, this proposition was put up to me and I was asked if I could do it and also get out 18,000 24/31 and 12,000 155 M. M. adapters along with the booster cases. My answer was, "Certainly, I can



FIG. 1. MARK III BOOSTER CASE (UPPER) AND 24/31 AND 155 M. M. ADAPTERS DESCRIBED IN THE ARTICLE.

do it," and the reply was, "All right go ahead and figure on the plant and everything else necessary and do it quick, we must get the plant in and operating at once."

So I immediately got busy. I asked questions of quite a few platers as to the best way of handling the boosters and adapters and tried to find some plant in the country that was electro-galvanizing them successfully, so that I might go and see them being finished. However, there was not a plant in operation doing such work. On inquiring of the different plating supply houses in New York and vicinity I found there were a few concerns electro-galvanizing Mark III booster cases on the outside only and varnishing them on the inside. While the contract that the people with whom I was dealing with required "electro-galvanizing inside and out."

The adapter is not a difficult article to handle, as it can be racked on trees made for the purpose and plated in an automatic moving tank satisfactorily. But the booster must be galvanized inside by the use of an inside anode and to figure on finishing 30,000 per day of ten hours meant some plant. However, I set to work and a few days after the proposition was put up to me I had my figures for a plant required to handle such work all ready, even down to the smallest detail of racks, material and men, boys and women needed to do the work. I also had a promise for the delivery of enough equipment to get started in ten days.

The different processes in practical use at that time were looked into and investigated very thoroughly. Quite a few different kinds of prepared galvanizing solutions were investigated. Samples were also tried out. Zinc cyanide solutions seemed to be giving good satisfaction according to the ideas of some people, but there were no concerns using this solution on a large scale at that time and the zinc cyanide solution had not been thoroughly tried out by the trade sufficiently for me to take any chances on it as I was given to understand that there was no time to experiment. So I decided, after careful investigation, to use a regular standard make of zinc galvanizing salts and this salt has been giving very good results. If I had had time to do more experimenting I would have adopted the zinc cyanide solution, for I have tried it out since I installed the plant and found that it would have answered the purpose and that less equipment and labor would have been required.

At present I am using a cyanide zinc solution for a strike in connection with the adapters, and which method I will explain thoroughly later.

The sample boosters as they came to us were clean on the outside, free from scale, but on the inside there was still quite a little fire scale. This made it necessary to pickle them and for this purpose I used a hot muriatic acid pickle arranged in 12-gallon crocks, set in a tank of hot water. The boosters were stacked with the open end up in perforated stone ware dipping pots and then immersed in the pickle. A hot cleaning solution made up from one of the commercial cleaners on the market was used before pickling. This cleaner was placed in an iron tank with a steam coil and false bottom in it on which the dipping pots were set. The tank is large enough to hold four pots at a time. The operator placed one pot in at a time and by the time the four pots were in the tank the first pot was ready to be taken out. The solution was emptied from the boosters and they were then immersed directly into the hot water, emptied and placed in the hot muriatic acid pickle for ten minutes. There were enough pots to keep twenty-two men continually pickling the booster cases.

After pickling the boosters are rinsed in hot water and then in the cleaner again to neutralize all the acid and then placed on a bench where they were racked on Nichrome metal racks, each rack holding 12 booster cases. These racks were $2\frac{1}{4}$ inches wide and $\frac{1}{8}$ inch thick with hooks to fit rods in the electric cleaner tank. The boosters were placed directly in the electric cleaner for a minute, passed into hot water, from the hot water into 42° nitric acid, then into cold water, then into muriatic acid (not diluted), on into cold water and then the cases were inspected and transferred onto steel racks to fit the plating tanks. The steel racks were fitted up with inside anodes for the booster cases, each rack having ten small zinc anodes, 5 inches long by $\frac{5}{16}$ inch diameter and each anode having a cotton stocking to prevent particles of zinc falling into the booster cases.

The plating tanks are 30 inches wide, 16 inches deep and 10 feet long, with thirteen anode rods running crosswise of the tanks. On these rods are suspended five elliptic shaped zinc anodes, 6 inches in length. This gives twelve cathode rods. The plating tank is fitted along the top on each side with a copper buss bar upon which the anode rods are placed and make a contact in

this way. The inside anode holders are drilled on each end to fit on a pin in the buss bars, in this way making sure that the inside anodes were always in the center of the booster cases. The cathode rod is run lengthwise along the side of the tank allowing the booster rack hooks space so as not to come in contact with the anode holder which have to be directly above the cathode rod.

The plating solution that I used gave a satisfactory deposit in twenty minutes and was used at 2 volts and 275 to 300 amperes. After plating the work is rinsed in cold water, placed in a hot soap solution for a few minutes and then blown out with compressed air in order to get all the dampness from the inside of the

dip, drained; third, immersed in the electric cleaner; fourth, rinsed in hot water; fifth, immersed in a diluted solution of hydrofluoric acid and suspended in this solution for about five minutes; sixth, rinsed in hot water; seventh, immersed in a 42° solution of nitric acid; eighth, rinsed in cold water; ninth, immersed in muriatic acid (not diluted); tenth, rinsed in cold water; eleventh, immersed in a dilute cyanide solution (about ½ ounce of cyanide per gallon of water); twelfth, immersed in a cyanide zinc strike for a minute; thirteenth, immersed in plating tank; fourteenth, rinsed in cold water; fifteenth, washed in soap solution used hot; fifteenth, placed on dryer; sixteenth, taken from racks and placed on trays.

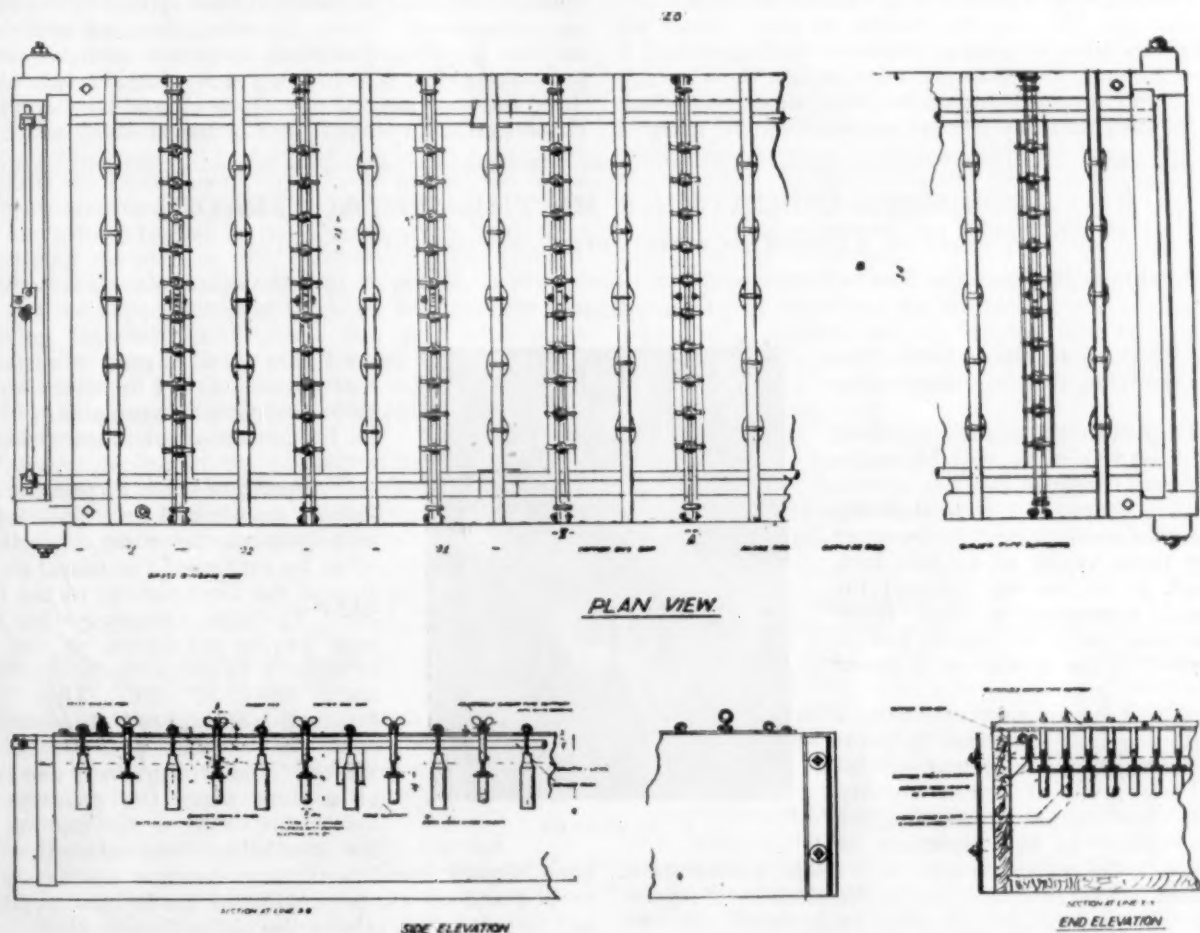


FIG. 2. VIEWS OF ARRANGEMENT OF WORK IN TANKS FOR ZINC PLATING THE ARTICLES SHOWN IN FIG. 1.

cases. The cases were then placed upon a conveyor or dryer made of brass wire mesh 30 inches wide with a steam coil underneath and a galvanized iron box covering the conveyor. The conveyor or dryer travels 1½ feet per minute, thus taking 9 minutes for the work to travel through it, after which the cases are deposited in boxes and are then ready for inspection.

All this seems to be a very simple process, but it required much thought and hard work before we had the work going well and about the time we were getting the required amount of production the armistice was signed.

The adapters were made in our factory and they came to the galvanizing department covered, or, in other words, swimming in oil. These adapters were handled on trees made of steel wire with brass hooks to fit the conveyor plating tank. The process for electro-galvanizing these adapters was as follows:—first, they were placed on a rack; second, immersed in a gasoline

It is possible to run in 10 hours 25,000 of the 21/34 and 10,000 155 MM. adapters giving them a 10 minute deposit in this conveyor tank.

We had a separate generator of 6 volts, 2,000 amperes operated with a 25 H. P. motor for the conveyor tank and cyanide strike where adapters were plated and we used 4 volts, 1,700 to 1,800 amperes on this work continuously all day. A 6-volt, 3,000 ampere generator operated by a 40 H. P. motor was used for the booster case tanks and a 15-volt, 500 ampere generator operated by 7 H. P. motor for two electric cleaner solutions, one being used for the adapters and one for the booster cases. A ½-H. P. motor was used to operate the conveyor tank, a ½ H. P. motor for operating the dryer for boosters and a 2 H. P. motor for the conveyor and drying room for adapters.

The zinc cyanide strike solution consisted of the following materials:

Water	1 gallon
Zinc cyanide.....	6 ounces
Sodium cyanide.....	6 ounces
Sodium hydroxide.....	2 ounces
Tin chloride	1 ounce
Soda ash	2 ounces

The solution was used at a temperature of from 110 to 120 degrees Fahr.

There is also another department where plating barrels are operated for galvanizing detonator fuse components. In this department there were 20,000 of each part to be finished per day of ten hours. There are four parts to fuse, namely: cap, washer, safety pin and the firing pin. In this department we used one of the standard electro-galvanizing solutions, making use of a strike solution and a finishing solution, the work getting a half hour in each solution. This department was operated automatically as far as possible, by using a

rotary cleaning apparatus, self-emptying plating barrels, with automatic self-emptying rinsing and drying apparatus. Two barrels, one dryer and one rotary cleaning apparatus with a 500 ampere 15-volt generator constituted a unit, there being three units. A half H. P. motor furnished power for each barrel, cleaner and dryer and a 7 H. P. motor for each generator. Each unit being operated separately, thus overcoming any chance of shutting down all units or barrels for repairs should something happen to the generator or motor. This department has been operating very satisfactorily for a year and is still in shape to go on should it be necessary to do so. We also zinc plated in these barrels 400,000 booster sockets after they had been spoiled in the soldering department. Every plater who has had anything to do with the plating of these sockets is aware of what a proposition this is. I found no trouble at all plating them and they were allowed to remain a half hour in the strike solution and half hour in the finishing solution.

BUSINESS CONDITIONS IN THE METAL TRADE

A REPLY TO A LETTER FROM THE EDITOR OF THE METAL INDUSTRY.

BY GUILLIAM H. CLAMER, FIRST VICE-PRESIDENT AND GENERAL MANAGER OF THE AJAX METAL COMPANY, PHILADELPHIA, PA.

In your letter of December 21 you have asked me the following questions:

1. Do you think the present prices for metals and labor will be maintained, and for how long?

2. Will there be a decided slump in business conditions for the next two or three years, or do you look for such an increasing demand for domestic consumption that there will be practically no gap to bridge in passing from a war to a peace basis?

In reply to your first question, I am assuming that you mean by present price, that you refer to the relatively low level of prices already existing as compared with those existing prior to the cessation of hostilities. Copper, although still under Government regulation, is quoted at 26c. per lb. for electrolytic copper—there are practically no sales being made at this figure.

There is being offered vast quantities of scrap copper of electrolytic quality at prices ranging as low as 17c. per lb., and the sales of casting copper in ingot form, being made by producers, at 19c. per lb., which is 7c. per lb. below the Government fixed price for electrolytic copper.

The large amount of scrap offered, and to be offered, is bound to have a depressing effect on the price which can be maintained for new copper; and it is quite safe to predict, notwithstanding the fact that the copper producers will attempt to maintain prices which are sufficiently high to net them an adequate profit under the present conditions and high cost of production, the price will after January 1 fall far below the present Government price.

There is on hand in Europe also, vast stores of scrap copper and copper containing scrap which can readily be converted into copper.

That a great shortage of copper exists, particularly in central Europe, there is no question; but just how soon



G. H. CLAMER.

conditions can become adjusted so that purchases may be made, is questionable. One fact remains, and that is, that a period of months will intervene.

The price of tin is at present artificially maintained until January 31, and perhaps for some time thereafter by reason of the moral obligation of the Government to the U. S. Steel Products Company—this company having purchased, on the Government's request, some 10,000 or more tons of tin. They have financed and agreed to distribute such tin without profit to themselves. This arrangement was made at a time when the country was threatened with a tin famine. In the meantime, the armistice has

been signed, conditions have become absolutely reversed and an excess supply of tin is now available, but this does not relieve the obligation.

By the present arrangement the consumer is the one who is fulfilling the obligation by paying the price which this tin cost delivered at New York. Should the Government fulfill the obligation, it could do so by purchasing this whole amount of tin at 72½c. per lb. and disposing of it in such a manner and at such times and in such quantities, that it would not demoralize the market and the Government be the loser to the extent of the price received for it as compared with that at which it was purchased.

It is questionable, in the writer's mind, if with the present lack of demand for tin and because of the production of tin in this country from Bolivian ores, that some arrangement, as here suggested, may not finally have to be worked out. If tin today was selling on the open market, the price would be 15 to 20 cents per lb. below that figure at which it is now artificially maintained.

The price of lead is still high in proportion to pre-war prices, but probably not high as compared with its present cost of production.

The price of zinc has for a long period been based entirely on supply and demand, and it is certainly not high as compared with the cost of production.

Antimony is already selling at a bed-rock figure.

So much for the prices of the commoner non-ferrous metals. Now as to other materials which are used in the foundry business, I do not think there is any question that these will also decline below present levels.

Regarding labor, I do not believe there will be a readjustment downward of the prices paid for labor unless it comes from the competition of labor itself. There is already a great amount of labor being thrown on the market which was previously employed in the war industries; and it is questionable if such labor can be promptly absorbed in the peace industries.

Unfortunately, the cost of living will probably continue at the present high level or go to even a higher level than at present, owing to the enormous demand for food products. The United States has pledged itself to supply twenty million tons. The price of wheat has been guaranteed by the Government, in order to protect the farmers who guaranteed to plant a very much greater acreage than heretofore, backed by the Government's promise of maintaining the price on this commodity. The Government is therefore morally bound in its pledge.

It was the experience after the Civil War that the cost of living increased until about one year afterwards. Namely, the cost of living was greater in 1866 than it was in 1865, and I believe that this condition will again prevail. The price paid labor should, and will, I believe, be maintained for this reason.

With the decline in the volume of business, the demobilization of our troops and the fact that so many women have now found new employment in the industries, will, in the event of a surplus of labor, lead to com-

petition among labor which will itself probably force prices downward.

Now, replying to your second question, I believe that there will be a decided slump in business conditions during a period of at least six months. I doubt very much if it will continue much beyond a short period of this kind. I feel quite confident that such conditions will not exist to the extent of two or three years.

I believe that after this temporary slump during the readjustment period, that a period of great prosperity will be launched; but before this gets into full swing, it will be necessary for the conditions at the peace table to have been arranged so that the nations of the world may interchange their products as they did previous to the war.

The same high cost of labor and material is now existing in the European countries as it is here, and it is quite doubtful if the unequal labor conditions will be re-established. The European countries have suffered a loss of man-power greater in proportion to its total man-power than has the United States, and this is bound to equalize, to a very large extent, the many other conditions which in the past have favored the lower prices paid for labor in the foreign countries.

I believe that the war will have done more for the equalizing of conditions the world over and in creating a more broad-minded attitude on the part of capitalists toward labor and on the part of the Government toward capitalists, than one hundred years would have done under peace conditions.

I believe that the United States of America is now destined to be a leader among the nations of the earth, in Government, in industry and in thought; and that we may look confidently forward to an era of great prosperity after a relatively short period of real depression.

NICKEL PLATING CAST OR SHEET ALUMINUM

One of the most successful methods of nickel plating cast or sheet aluminum is as follows:

First—Clean and polish the aluminum to produce the basic finish.

Second—After polishing remove the excess of polishing grease or buff dirt by aid of gasoline or benzine, then dry out carefully in maple sawdust.

Third—Clean in the following alkali solution.

Water	1 gallon
Tri sodium phosphate.....	4 ounces
Soda ash 58%.....	4 ounces
Powdered yellow resin.....	¼ ounce

Use the solution at a temperature between 180 to 200 degrees Fahrenheit. The articles should be immersed in the cleaner for a few minutes, then removed and washed thoroughly in clean cold water.

Fourth—Prepare an acid combination of the following materials:

Sulphuric acid 66%.....	½ gallon
Nitric acid 38%.....	½ gallon
Sesquichloride of iron (crystals)	1 ounce

This acid dip should be prepared several hours before using, preferably the previous day.

Fifth—Immerse the clean aluminum articles in the acid dip for a moment or two then wash thoroughly in cold water and plate direct in the nickel solution at 3 to 3½ volts.

Sixth—The nickel solution should be prepared as follows:

Water	1 gallon
Single nickel salts.....	10 ounces

Double nickel salts.....	2 ounces
Epsom salts.....	2 ounces
Boracic acid.....	2 ounces

Plate the articles until a satisfactory deposit is obtained. It is always an advantage to use a little higher voltage at the start.

Another satisfactory method is to use the nickel solution with a double throw switch. For instance, the aluminum articles to be nickel plated are momentarily made the anodes, which reduces the oxide; the switch is then reversed and the articles then become the cathode and the nickel is deposited as usual. The cleaning method as outlined above must also be employed with the use of the double throw switch if successful results are desired.

In order to prevent the contamination of the acid dip or deoxidizing solution with copper, use soft iron wire for stringing purposes instead of the copper wire. The iron wire helps to maintain the iron in the acid dip which is necessary for satisfactory and successful results. After nickel plating the aluminum articles may be plated in any cyanide solutions for brass, copper, silver or gold.—C. H. P.

OXIDIZING BRONZE.

The formula for oxidizing bronze is as follows:

Water	1 gallon
Caustic soda	8 ounces
White arsenic (powdered) ..	.4 to 6 ounces
Sodium cyanide	1 to 2 ounces

Iron anodes should be used in this solution.—C. H. P.

CUPRO-NICKEL

AN EXAMINATION OF ITS PHYSICAL PROPERTIES AND STRUCTURE

WRITTEN FOR THE METAL INDUSTRY BY T. H. A. EASTICK.

The alloys of copper and nickel, particularly that of the composition of copper (Cu),—85%—nickel (Ni),—15%, have been in use for many years, but like many other common non-ferrous alloys, its physical properties, structure and metallographic characteristics have only recently been investigated. In fact, it is safe to say that the properties of this truly remarkable alloy are almost unknown. The alloy, Cu 85%—Ni. 15% which is the standard "Cupro-Nickel," so called, offers a combination of strength and ductility surpassed by very few copper alloys, while its color, resistance to corrosion and the extent to which it can be cold-rolled without annealing render its use for a great variety of purposes in manufacturing plants very desirable.

The production of Cupro-Nickel in this country in the past three years has been very large, due to its use for bullet covers or jackets. Practically all the rifle cartridges of all nations specify cupro-nickel for bullet jackets, and some idea of the large quantities of this alloy consumed for this purpose may be gathered from



T. H. A. EASTICK.

"Physical Metallurgy," by Rosenhain). This fact is illustrated by the Equilibrium Diagram for this alloy series shown in Figure No. 1. It will be observed that the melting point of any given alloy in the series is quite perceptibly higher than the solidification temperature and that consequently there are two curves, known as the "liquidus" and "solidus." This phenomenon is peculiar to many other solid solutions, but in the cupro-nickel series, it is quite pronounced and has a great influence on the physical properties of the resulting metal. In fact the phenomenon of metals freezing immediately at a definite temperature is peculiar to pure metals and outectics only. With solid solutions, on the other hand, there is always a well defined range

of temperature through which freezing or melting takes place. The presence of both the liquidus and solidus indicates that a given alloy commences to melt upon reaching the temperature indicated by the solidus curve and is completely liquid upon the reaching of the temperature indicated by the liquidus line, while in

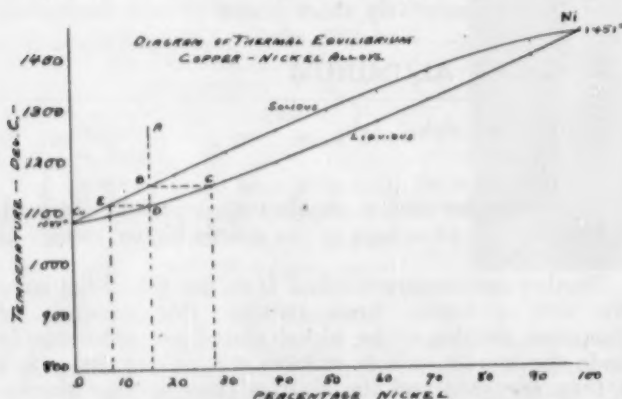


FIG. 1. EQUILIBRIUM DIAGRAM FOR CUPRO-NICKEL.

the fact that approximately 30 lbs. of sheet metal are required for every 1000 bullets. The general result of the greatly increased demand for this alloy has been that a number of the newer metal companies have got into the production of cupro-nickel with varying success, and the cost of the metal is quite high.

There is nothing mysterious about the casting, rolling and working of cupro-nickel, and with complete data on the metallurgical characteristics and physical properties of this metal, there should be no particular difficulty in successfully producing it. It is the purpose of this article to deal with the more important of these metallurgical and physical characteristics.

The alloy series Copper-Nickel form what is known as a solid solution, that is to say, the two metals not only go into solution in the liquid state but remain in this state upon solidification, (for information as to the full meaning of the term solid solution and other data on metallography, the reader is referred to

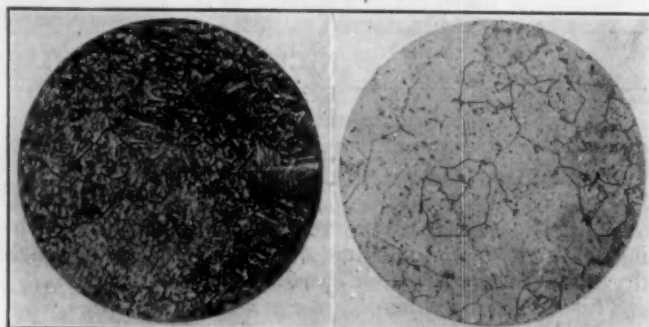


PLATE 1. NO. 1. CUPRO-NICKEL CAST STRUCTURE BEFORE ANNEALING, MAGNIFIED 85 DIAM. NO. 2. CUPRO-NICKEL CAST BARS. AFTER ANNEALING 2 HOURS AT 2,000° F. 85 DIAM.

the range of temperature between the two curves the alloy is in a "pasty" condition. The effect of this phenomenon on the structure of the alloys will now be dealt with.

If we take the alloy containing 15% nickel, (Figure 1) at a temperature above the liquidus line as at A, we find that this metal remains liquid, upon cooling, until it intersects the liquidus line, at which point, B, crystals of solid metal will be deposited. The higher the percentage of nickel, the higher the melting point of the alloy, therefore the first material to freeze will be nickel-rich in concentration. The composition of the metal first to freeze may be obtained by laying off the horizontal line BC until it intersects the solidus curve; at this point C, a perpendicular is dropped, thus indicating the percentage nickel present in the portion of the alloy first to freeze, which in this case we find to be 28%. As the freezing continues, the concentration of nickel in the metal freezing will decrease very

rapidly until solidification occurs; the last metal to freeze will be indicated by laying off the horizontal line DE until it intersects the liquidus curve, at which point, E, a perpendicular, is dropped, thus indicating that the composition last to freeze is 8% nickel.

The effect of this phenomenon is, of course, to render the metal unhomogeneous and it has what is known as a "cored" structure; i. e. the center of a grain of the alloy will consist of a core rich in nickel. This core will be surrounded by concentric layers containing an increasing percentage of copper. The variation in composition due to this segregation will be from 8% nickel to 28%, which simply means that adjacent grains of the alloy will vary widely in composition, thus presenting a condition which might well be expected to give trouble in subsequent cold-working operations.

The casting conditions most conducive to the occurrence of the cored structure described, are where the casting is rapidly cooled after pouring. It is essential, in order to obtain the best possible quality of finished product, to remove segregation and the cored structure and to effect this, the casting is maintained

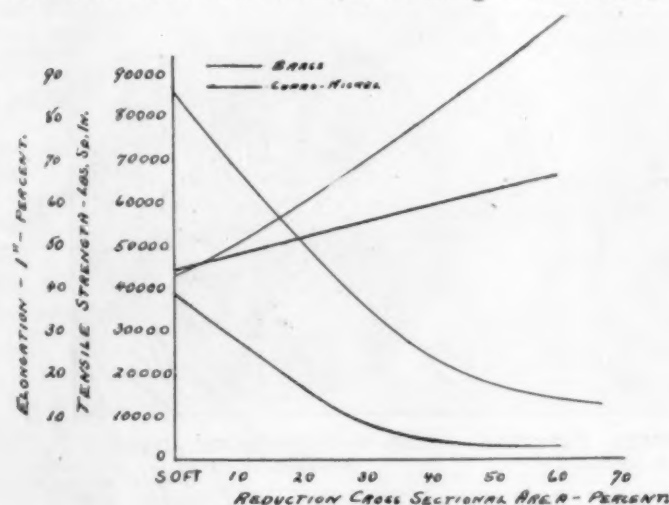


FIG. 2. CHARACTERISTIC CURVE OF CUPRO-NICKEL, COPPER 85, NICKEL 25 PER CENT.

at a temperature sufficiently high to enable diffusion to take place so that the whole mass becomes a homogeneous solid solution of uniform nickel concentration throughout. It should be clearly understood that this initial heat treatment of the casting must be performed before cold-rolling the metal, otherwise diffusion is exceedingly slow, and, in fact, the cored structure persists all the way to the finished drawn article.

The temperature at which diffusion, or the "initial-anneal" as we may call this operation, can most economically be effected is approximately 1700° F. The time, of course, will depend on the way the cast bars are stacked on the muffle pan and on the mass to be treated, but it will be found necessary, after the metal has come to temperature, to hold it at this temperature for at least two hours in order to completely remove the "cord structure" as shown by the microscope.

Plate 1, Nos. 1 and 2 are photomicrographs illustrating the change taking place in the structure as the result of the initial anneal. It will be observed that the "cores" have disappeared entirely and the structure has "cleared up" as it were. It will be noted that the treatment this particular sample received was 2000° F.

for two hours. This temperature is too high for practical purposes and approximately the same result may be obtained at 1700° F. for three hours.

CASTING

Cupro-nickel (15%) melts at about 2100° F. The proper casting temperature should be approximately 2400° F. It is a general practice to add Manganese-Copper in small quantities as an oxidizer or "scavenger." It is probable that a small percentage of Manganese (about .20%) in the metal is beneficial. In any case .30% Manganese in the form of Manganese-Copper should be added to the crucible shortly before pouring and the metal thoroughly stirred.

Ordinary care should, of course, be taken in the selection of scrap. Cut up bars, "gates," and cupping scrap are most desirable and at least 30% should be used in the mixture. If no scrap is available, it is a profitable proposition to cast some metal and cut it up and use it for scrap. A much more homogeneous

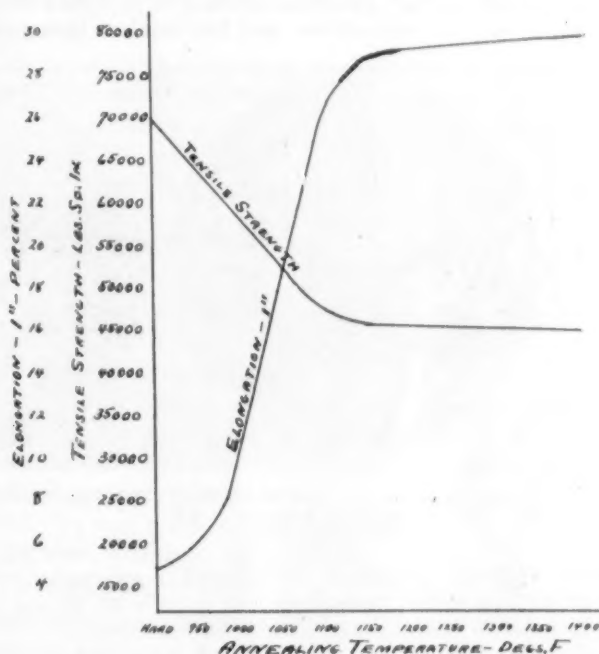


FIG. 3. TENSILE STRENGTH AND ELONGATION CURVES OF CUPRO-NICKEL.

alloy is obtained in this way than if new metals entirely are used. Norway iron stir bars should be used and the more stirring the metal receives the better.

Inasmuch as the cost of the mill operations is high, extra care should be taken not to allow any defective metal to get past the shears. "Pipes" and "Seams" are sometimes difficult to find and, in the writer's opinion, the employment of a high-grade experienced high-priced man as inspector at the shears is excellent economy.

It is unnecessary to consider the copper that should be used, except to say that the best grades of Electrolytic Copper are required.

There are two grades of nickel on the market for alloying purposes, "shot" nickel and "electrolytic" nickel. There is little to choose between the two grades, except that the "electrolytic" is most generally used. This metal comes in the form of thin nodular plates which are easily cut. It is excellent practice to make careful analysis of each lot before using. Especial attention should be paid to the Carbon and

Iron content. Carbon should not exceed .05% and Iron .25%.

MILL OPERATIONS

After leaving the shears the cast bars are annealed as described above to remove segregation. The most desirable procedure is to charge the cast bars into the muffle late in the afternoon and fire up until the temperature in the muffle is in the neighborhood of 1700° F. This temperature should be maintained until nine or ten o'clock at night at which time the fire is shut off and the cast bars allowed to remain in the muffle overnight.

The matter of what runs should be used in the mill depends entirely on such conditions as the diameter and speed of the rolls, available power and width of bars. "Fire-cracking" is quite common with cupro-nickel and where such trouble occurs it will almost invariably be due to insufficient reduction. Another cause of "fire-cracking" is found in the mold having too much "crown."

Generally it will be found desirable to break down from 1" to .750" and anneal and overhaul at this point.

pickle should be made up as needed each day.

PHYSICAL PROPERTIES

Figure II. is what is known as the Characteristic Curve of Cupro-Nickel, Copper 85%, Nickel 15%. This curve shows the physical properties of cupro-nickel when rolled to various reductions of cross-sectional area. Plotted on the same chart is shown the characteristic curve of a common high brass for comparison. It will be noted that the Tensile Strength of the brass increases with the reduction of area to a much greater extent than does the Tensile Strength of Cupro-Nickel and the Elongation shows a correspondingly sharp decline with brass as against cupro-nickel. This is one of the outstanding peculiarities of cupro-nickel and one which has considerable practical importance, because of the fact that cupro-nickel is able to withstand considerable reduction without annealing before fracture.

Cupro-nickel which has received a reduction of area of approximately 60%, begins to soften; i. e., the Tensile Strength begins to drop and the Elongation to rise at approximately 950° F. This is shown in Fig. III, in which the physical properties are plotted against

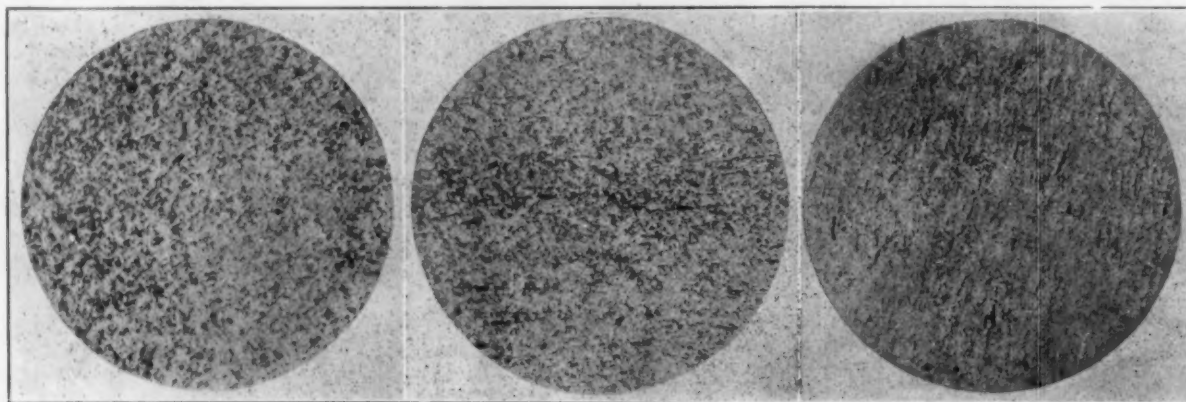


PLATE 2. NO. 3. CUPRO-NICKEL, ANNEALED AFTER ROLLING AT 1050° F. 85 DIA.

NO. 4. CUPRO-NICKEL ANNEALED AT 1260° F. 85 DIA.

NO. 5. CUPRO-NICKEL—HARD ROLLED. 85 DIA.

From .750" the metal may be reduced to approximately .350" before again annealing. It is safe to figure on 50% to 60% reduction of area between anneals.

Cupro-nickel forms a very hard thick scale when annealed in an oxidizing atmosphere and special attention should be given to the proper combustion of the fuel to insure a slight reducing atmosphere at all times. The metal may be quite safely quenched immediately after withdrawing from the muffle, this practice will eliminate considerable scale. There is probably no other annealing problem which will test the performance of the muffle more severely than cupro-nickel and where large quantities of this metal are to be annealed, it is out of the question to attempt to use some of the weird and wonderful aggregations of fire-brick and cast iron into which gas flames are promiscuously shot, which, unfortunately, are found in many of our American Mills.

Cupro-nickel is very difficult to pickle and clean. Of course, the intermediate pickling operations between runs are not so important but it will be found very desirable to leave the bars in the pickle solution an extra long period of time on the final pickle before drying and cleaning. Quite often bichromate of soda is used in the pickle solution to give a bright clean surface. One pound of bichromate of soda to every ten gallons of solution should be sufficient. This solution soon loses its strength and only small quantities of

the annealing temperatures. The time factor appears to be of much importance in annealing cupro-nickel. In order to obtain maximum ductility in hard-rolled sheet metal it should be maintained at a temperature of 1250° F. for at least one hour. By this is meant that the charge in the muffle should be brought to 1250° F. and then maintained at this temperature for one hour. The total elapsed time between charging and withdrawing charge from the muffle will depend on the amount of metal and on the way it is stacked on the pan.

Crystal growth in cupro-nickel is very sluggish, hence the necessity for maintaining the metal at the annealing temperature for a longer period than is usual with brass and other copper alloys. Even with fully annealed metal the crystals are extremely small. Plate 2, No. 5, shows the structure of hard-rolled cupro-nickel. Hardly any trace of the original crystal structure can be observed on account of the distortion due to rolling. Plate No. 3 shows the same metal after annealing at 1050° F. for one hour. It will be noted that an extremely fine new growth of crystals has commenced. Plate No. 4 shows the structure of the same metal annealed at 1250° F. for one hour, and this structure is fairly representative of fully annealed cupro-nickel. The crystals here shown are about as large as ever found in cupro-nickel which has been treated in the ordinary way.

EDITORIAL

Vol. 17

New York, January, 1919

No. 1

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SEVENTEENTH YEAR

In entering on our seventeenth year we have the pleasure of presenting our readers and advertisers with a one hundred and eighty page journal—the largest that we have ever issued. Edition 6,250 copies.

We believe our readers will agree with us that our text, as usual, contains matter of special timely interest and that the various processes in the fabrication of metals are generally well represented.

Our advertising pages are representative of the best manufacturing firms in the industry who are engaged in the production and distribution of metals, machinery and supplies which are suitable for the metal and plating shops.

With the ending of the war we have withdrawn our Honor Page on which, during the belligerent period, we had the pleasure of portraying the war heroes who went from the metal shops to the service of their country. At present we are publishing the letters giving the experiences of metal industry soldiers.

Of all the journalistic work THE METAL INDUSTRY did the past year none gives us more satisfaction than the effort to do our bit to win the war. In company with all of the best trade journals we presented the government with hundreds of dollars' worth of "Win the War" advertising and in our reading columns printed all of the suitable matter possible to aid the just cause of the Allies. We have received several letters of appreciation from the different Government bureaus for our work in this direction.

With the signing of the armistice we may all hope for the successful fulfillment of a League of Nations or some sort of an international institution which will grant the world peace forevermore and that the nations of this earth can again enter into the friendly competition and the profitable commerce practiced in the days of Peace.

In the re-adjustment and re-construction period which is now taking place we believe that America, having become so renowned for her deeds of valor on the battlefield, will correspondingly occupy a more prominent place in the equipment and supply of the world's markets.

The fulfillment of the gigantic task forced upon us in the European struggle will give us a greater name among the world's consumers. Our resources, ability and power have been put before the peoples of the earth, have been advertised in fact as never before and these peoples will look more favorably than ever upon American made products.

As an aid to familiarize the world with products of American metal manufacturers THE METAL INDUSTRY will circularize more largely than ever in foreign lands. We will see that our journal reaches the English speaking metal shops of the world and even the shops of different tongues where frequently there is some one who can read industrial and commercial English.

RETROSPECTIVE REVIEW OF 1918—OUTLOOK FOR 1919

While there was not a great deal of difference noted in business conditions existing in the years 1917 and 1918, there certainly was a vast difference in the events taking place in these two years. As 1917 has been termed a year of preparation so 1918 can be registered as the year of great achievement. Contrary to general expectations, even among those who seemed to be best qualified to judge, the great world war came practically to an end. From the beginning of May, 1918, when the Allies started the great offensive in France and Italy important happenings came thick and fast. The United States draft worked smoothly and expeditiously and by the end of September over 2,000,000 American soldiers had been sent overseas to take their place in the great conflict. First Turkey, then Bulgaria decided to quit, they were followed by Austria who decided she had suffered enough and cried for peace on November 3, Germany collapsed through internal eruption at home and a rapidly weakening army in the field. November 11, 1918, will always be remembered as the ending of the world war for the armistice was signed on that day. Peace negotiations are now going on in France and when deliberations are brought to a close we are sure that it will be impossible for war to again disturb the tranquility of the world.

Business in 1918 has been essentially one grand expansion of the preparations started in 1917. Smelteries, metal rolling mills, metal shops and, in fact, the whole manufacturing world was given over to the making of munitions and other materials for war purposes.

Financially the country surpassed all previous records there being two Liberty loans floated, one in April for four billion dollars and one in October for six. Then in November came a tremendous drive for \$250,000,000 for seven united organizations such as the Red Cross, the Y. M. C. A., the Knights of Columbus, the Salvation Army, etc. In December occurred the final drive for funds for the year 1918. This was a campaign for membership in the Red Cross, a goal of twenty million members being set and at last accounts this had been attained.

METALS IN 1918.

The metals in 1918 held to the same high prices as in 1917. The Government commandeered the tin and platinum supply and regulated the prices as in 1917 of copper, aluminum and spelter. Silver and gold also were restricted in their uses for a brief period. Regarding the use of tin a call was sent out from Washington for conservation and some very valuable data was collected on this subject and presented at the meeting of the Institute of Metals Division of the American Institute of Mining Engineers held at Milwaukee, Wis., in October, 1918. A full report of this tin conservation symposium appeared in the October issue of *THE METAL INDUSTRY*. With the close of the war, however, conditions changed and it is now possible to obtain Straits tin in the market.

The Metal Chart which is presented in this issue of

THE METAL INDUSTRY gives a fair idea of the trend of prices of the metals for 1918. At the close of the year the lines indicating price are trending downward and there is every reason to look for further reductions when domestic business competition sets in again. In fact, prices of brass and of other manufactured alloys of copper have already declined and it appears as though still lower prices may be expected as the mills begin to reach out for more business to keep occupied their tremendously expanded facilities.

THE MILLS IN 1918.

The story of the brass and copper rolling mills in 1918 does not differ materially from that of 1917. They were all heavily engaged in war work, most of them at 100 per cent. While there was no really new mill established in 1918, one, the Cleveland Brass and Copper Mills, Inc., described in the January, 1918, issue of *THE METAL INDUSTRY* started to produce early in the year and has held its own despite some annoying labor troubles. A new seamless tube mill has been projected for Cleveland, Ohio, and at the present time is in process of organization having gone so far as to acquire a building site at the western end of the city. This mill proposes to produce seamless tubes of copper and brass and make a specialty of condenser tubes, the demand for which is increasing due to the extensive building of ships now going on.

There has been on the other hand some defection from the ranks of the established mills. The Philadelphia Brass Company of Downingtown, Pa., and the Connecticut Brass Corporation are at the present writing in the hands of receivers and their future fate hangs in the balance.

CHRONOLOGY.

The number of men important to the metal industries removed by death in the past year was so heavy that it seems worth while to recount them here. Among those recorded by *THE METAL INDUSTRY* were the following: In January, Edwin J. Keane, secretary of Hendricks Brothers, proprietors of the Belleville Copper Rolling Mills, Belleville, N. J.; William A. McAdams, a well-known metallurgist and inventor of McAdamite, an aluminum alloy. In March, Henry S. Chase, president of the Chase Rolling Mills, Waterbury, Conn., Elisha J. Steel, vice-president of the Coe Brass Branch of the American Brass Company at Torrington, Conn. In April, George J. Jackson, president of the National Cable and Conduit Company at Hastings-on-the-Hudson, N. Y.; Philip M. Scheeler, treasurer of the Buffalo Wire Works, Buffalo, N. Y. In June, Cyrus O. Baker, president of Baker and Company, platinum refiners, Newark, N. J.; Dr. James Douglas, chairman of the board of directors of Phelps, Dodge & Company, New York. In July, Chauncey P. Goss, president of the Scovill Manufacturing Company, Waterbury, Conn. In October, Edward Randolph, president of Balbach Smelting and Refining Company, Newark,

N. J.; Charles D. Bennett, president of Bennett-O'Connell Company, Chicago, Ill., and Charles G. Roebbling, president of the John A. Roebbling & Sons Company, Trenton, N. J. In November, John Calhoun, Coe Brass Branch of American Brass Company, Torrington, Conn., and Professor Pierre de Peyster Ricketts, of Ricketts, Inc., a metallurgical firm of New York City.

These men had all made their mark in their chosen field and they undoubtedly will be missed for many years to come, but their places have been and will be filled in some cases by sons and others perhaps not related by blood, but in any event by those who have been trained to carry on the work that has been established along certain definite lines.

Not so in the case of a death that occurred on January 6 of this year when Theodore Roosevelt suddenly and quietly breathed his last. For him not only a certain section mourns, but the whole country and even the world will feel his loss. For him there is no understudy and we will wait a long time before his equal appears. Perhaps the best tribute to Theodore Roosevelt is contained in the words of his life-long friend, General Leonard Wood:—

"Theodore Roosevelt is dead, but his spirit, his example, live after him, and will ever be a strong influence for better individual and national life. We have lost a great leader in a crisis in the nation's life, a leader who always placed the people's interests before all others, a leader who defended his country, arms in hand in war, freely offering his life, as have his sons in this war and as he himself tried to do. His death at this time is a national calamity, depriving the nation of his wise counsel, his conscientious and courageous leadership, which feared nothing so much as wrong or failure to do his duty. His life, his ideals, his accomplishments will always be an inspiration to those who see in service to humanity, in unselfish endeavor and in duty done, life's best reward.

"His voice is silent, but his influence for good lives on. His spirit will march in the van of our armies in war, and in peace it will strengthen our righteous efforts.

"True patriot, model citizen, devoted husband and father, wise leader, best type of American, such was Theodore Roosevelt—the world can ill spare him."

NEW DEVELOPMENTS IN 1918.

The greatest advance made in the melting of metals has been effected by the development of the electric melting furnace. This furnace in its various forms has been described during the past year in *THE METAL INDUSTRY*, articles appearing in January, *PROGRESS OF ELECTRIC METAL MELTING*; July, *A ROCKING ELECTRIC BRASS MELTING FURNACE* and August, *THE DEVELOPMENT OF ELECTRIC METAL MELTING FURNACES*. There is no doubt but that the electric metal melting furnace has come to stay. Just at present with the high cost of materials, no doubt the installation of the electric furnace will make it prohibitive for the small foundry. So at present the crucible manufacturer need have no fear of the elimination of the crucible, but even if this were so, there will always be needed the refractories for the furnaces such as linings and also the carbon electrodes, which are continuously consumed and must be replaced. The two great advantages of the electric furnace which make it so welcome to the metal melter are: First, that it can be handled by practically unskilled workmen and second, it does away with the expensive and disagreeable metal recovery system

so necessary to the pit-fire furnace installation.

Another interesting development in 1918 was the production by Albert H. Wehrle of Derby, Conn., of a machine for tinning metal on one side. This machine was described in *THE METAL INDUSTRY* in June and seems to fill a long felt want and particularly so at this time when tin is so high in price.

Considerable progress was made in 1918 in electroplating and these developments have been well described in an article by Charles H. Proctor, which appears in this issue of *THE METAL INDUSTRY*.

NEW EQUIPMENT IN 1918.

Despite the fact that the work of the United States along manufacturing lines during 1918 was supposed to be for war purposes a number of new devices and methods were brought out. Some of the more important of these which were recorded in *THE METAL INDUSTRY* are as follows:—*THE WATROUS GALVANIZING PROCESS*, in January; *IMPROVEMENTS IN THE BATES PEARD ANNEALING FURNACES* in February; *THE MAXIM PREMIX BURNER*, in March; *MONARCH NON-CRUCIBLE METAL MELTING FURNACE*, in April; *DIVIDED SUCTION BLOWER HOOD*, in May; *NEW SCRAP METAL COMPRESSOR*, in June; *A CONTINUOUS BRIGHT ANNEALING FURNACE* and *A NEW ENAMELING PLANT* in July, *A NEW HIGH TEMPERATURE CEMENT* in August, *THE DEISTER CONCENTRATOR* and the *CORNWALL DROSS CONVERTER* in October, *SKEW CRANES FOR FOUNDRIES* in November and the *NATIONAL PLATING BARREL* in December.

From this it will be seen that a month of the year did not go by without some new equipment or an improvement on an existing one being brought to the attention of the metal worker.

OUTLOOK FOR 1919

There never was a year that opened with better promises for big business. In order to get an idea of the opinions of some of the more prominent metal men we addressed a letter of inquiry to a number. We publish their letters in this issue of *THE METAL INDUSTRY* and the confident tone of all of them is noticeable and most encouraging. Then too the letters of our correspondents from the various cities to be found in the Trade News section all show the same feeling of optimism and ambition for bigger undertakings.

The country is ready and waiting for a resumption of business on a larger and broader scale than ever before and there is really only one great problem to be solved. This is the relations between capital and labor and the best minds in the world are now at work upon it. It has been stated by an eminent economist that one of the first requirements, if we are to make any headway at all, is to create some central authority, in which capital and labor will be fairly represented and which will command the confidence of the workmen. We believe this to be the best solution we have yet heard of. The organization and institution of so complex a body is naturally surrounded with many difficulties, but the opportunity is already available through the prevailing good will of the best type of employer and the desire of the mass of the workers to obtain real security.

It is only by the full co-operation of capital and labor in place of the old hostilities of the past, and the creation of a genuine understanding that their interests are essentially one and the same and that those who on either side would cause enmity by attempting to exploit the strength of their position must be considered and treated as outlaws—only on that basis can we hope for lasting industrial peace.

CORRESPONDENCE AND DISCUSSION

While we cordially invite criticisms and expressions of opinion in these columns, THE METAL INDUSTRY assumes no responsibility for statements made therein.

RESOLUTIONS FOR A METAL EXCHANGE

To the Editor of THE METAL INDUSTRY:

The following resolutions were offered by the writer before the non-ferrous metal group of the War Emergency and Reconstruction Conference, held at Atlantic City, under the auspices of the United States Chamber of Commerce, with reference to the need for a representative American metal exchange.

Although those comprising the non-ferrous metal group were in accord with the spirit of the resolution, it was not thought advisable to push the matter before the conference, as it was deemed distinctively a problem for the metal consuming and producing trades of America to take into consideration.

In his address before the metal group, the writer called particular attention to the need for a genuine representative metal exchange in America, saying in part:

"America produces the bulk of the world's supply of basic metals, copper, lead and spelter. Before the war prices on these American produced metals were made on the German and English metal markets. America invariably followed the London and Berlin metal exchanges.

"The producer and consumer of American copper and spelter awaited anxiously each day for the London Metal Exchange quotation, so that he might buy or sell his metal accordingly.

"Why was it necessary for America to allow foreign interests to fix the prices on American copper, American lead and American spelter? It was because this country possessed no suitable metal exchange worthy of the name, where prices might be made by actual transactions, covering the purchase and sale of these metals. America by reason of her importance as the world's greatest metal producer of right ought to be the metal market of the world—with the world looking to America to supply at American prices the metal that American labor produces and American capital finances. Not only would it make our position in raw materials pre-eminent, but it would enhance our business in metal products of all kinds were America known and recognized as it ought to be known and recognized, as the world's primary metal market. America can only be so recognized as the world's metal market if she has established a real, impartial, representative metal exchange. Instead of America anxiously awaiting foreign cables indicating the price of American produced metals, the world would anxiously await news from America as to the market on these metals.

"Can't you gentlemen see, how under the old state of affairs, an opportunity is extended to both England and Germany to exploit these basic American metals? The price of the metals could be forced down, with America following the foreign markets invariably, and these foreign interests operating the metal exchanges could purchase our metals and force the price back again to its old or higher levels.

"Before the war, metal prices of the United States virtually were made by Germany, whose interest in the English market enabled her to influence the London cables on which New York prices were based and thus control New York transactions with the result that when Germany wished to buy copper for instance, the London copper cables showed heavy declines, but when American consumers were in the market for material, the cables indicated advances."

THE RESOLUTIONS

Whereas, The United States is the largest world's producer of basic metals, copper, zinc, lead, and

Whereas, Previous to the war, the market price of these metals was fixed on the German and English metal exchanges, and

Whereas, The United States previous to the war followed the German and English Metal Exchange prices, and

Whereas, This country possesses no adequate metal exchange where markets may be made by actual transactions, purchases and sales on the exchange, and

Whereas, The pre-war system extends an opportunity to both England and Germany to exploit these American basic metals, and

Whereas, America is and ought to be of right, the metal market of the world, and

Whereas, Our foreign trade would be greatly enhanced in both basic metals and metal products of all kinds, were the United States known as it ought to be known as the primary market for the metals it produces; therefore, be it

RESOLVED, That it be the sense of this body, that the present metal exchange of the United States is not a representative American exchange and its market quotations are not representative of actual transactions and, therefore, not worthy of support by the metal trades, and be it further

RESOLVED, That the War Emergency and Reconstruction Conference of War Service Committees favors the immediate formation of a suitable metal exchange, which shall be representative of the great American metal producing and consuming trades.

L. M. BRILE, Vice-President and Sales Manager.

United Smelting and Aluminum Company,
New Haven, Conn., December 14, 1918.

[The attention of the managers of The New York Metal Exchange was called to Mr. Brile's resolution but they had "nothing to say."—ED.]

METAL PARTS IN WAR SERVICE

To the Editor of THE METAL INDUSTRY:

It may be of interest to some platers, especially those engaged in plating typewriter parts, to know how well typewriters that are used in the field by the army stand up under the conditions that they are subjected to. It must be remembered that neither the care nor the attention is given these machines used by the army in the field that is given to those used in offices. They frequently get wet, either from moisture or rain and rusting starts in. Typewriters finished in nickel, oxidized copper and Coslettized find their way into the army. The nickel and oxidized copper finished machines stand up very well even after lengthy usage and being exposed to all sorts of conditions, rust appearing only on the parts that are subjected to great friction. This is not so, however, with typewriters which have been finished by means of the Coslettizing process for the entire machine, a short time after being put in service in a damp atmosphere, begins to rust. In the re-plating of such Coslettized parts the following has been noted.

(1) The rust appears only upon the surface, that is, upon the black scale and does not penetrate in the metal below.

(2) The surface of the metal parts underneath the black oxide of iron is penetrated by zinc. Whether this is one of the features upon which the Coslettizing process has been recommended as a rust protection, is at present unknown to me. I do not remember ever having read anything about this or heard anyone mention it. Neither am I in a position now to look up the matter.

The penetration of zinc into the steel parts during the process of Coslettizing was found out purely by accident. It was but a small job and the only one on hand. The polishers had brushed off all of the black oxide and rust with a bristle brush and emery paste. As the job was such a small one a small pot of potash for cleaning was heated up instead of heating up a large tank and the wired articles were placed in the pot. The articles were forgotten for a couple of hours and when thought of again and removed from the potash it was noticed that the slinging wires were coated white. Reflection revealed and prompted the thought that the surface of the steel parts may have been penetrated by the zinc used in the Coslettizing solution. Later investigation on Coslettized articles confirmed this view.

The plater has long known that Coslettized articles did not make the success in rust prevention that had been expected of them. It might further be stated that once a machine that is Coslettized begins to rust, the formation of rust goes on so rapidly as to prevent the machine operating properly, with nickel and copper oxidized machines this has not been found to be so and these machines, although rusted in parts, continue to operate until some defect happens in the mechanism.

Medical Repair Shop No. 1. Sergeant JOSEPH HAAS.
Post Office, No. 702.
A. E. F. France.

HOW THE GERMANS KEPT A HOLD ON THE METALS

A VIVID ACCOUNT BY THE AUSTRALIAN PRIME MINISTER OF THEIR WORLDWIDE METHODS.

Attention has been called a number of times to the manner in which the Germans managed to dominate in the control and price of nonferrous metals. One branch of their organization was taken over by A. Mitchell Palmer, the Alien Property Custodian. This concerned itself with handling the metals in this country. But the ramifications of the German octopus were never as graphically described as in an address made by W. M. Hughes, the Australian Prime Minister, at the Mansion House, London, some time ago while the war was still on.

He took as his text what he called the great firm of Mertons, as the British end of the German trust was designated. He said it was "a living outward and visible sign of the rottenness within," and an agent of the enemy. Then he went on to say:

"It is the English branch of one of the greatest companies the world has ever seen; it is a combination, an octopus whose tentacles extended before the war all over the world, and whose heart was at Frankfort-on-Main. It is an organization that had a stranglehold on the whole of the world, that affected not only its commercial and industrial life, but affected also the political life; which worked unceasingly for the commercial benefit of Germany, which gathered huge profits for the benefit of Germany. It is true it may have thrown some of its profits to a non-German director or shareholder, as they throw bones to a dog, but it was for purposes of Germany, it was for her commercial aggrandizement and for the purposes of the expansion of the power of Germany, that this organization lived. It was a most powerful and a most serviceable instrument in the German policy of penetration. It served the power of the Kaiser better than a dozen legions on the field, and it is now here today, as it has been, with its ramifications in our midst. You cannot kill an octopus by just drawing out the joint of one tentacle. That is not the way you can kill an animal like this. It still has its power, the profits are being gathered in—this firm, which for three years after the war was the London agent, the English agent, of the American Metal Company, of which I shall speak in a moment.

"This was the firm from which Britain bought for twelve months after the war the metals necessary for carrying on the war, and it is true to say that thousands of English, Australian, Canadian, and French soldiers were killed with Australian lead—through this monopoly by German agents, sold to Britain at exorbitant prices, so that they were making their profit out of it, and the bullets which struck our breasts were drawn from the mines of Australia. It was until last April or May, I think, this firm was made the agency from which the British Government bought nickel. It was an agency in the name of Metallurgische Gesellschaft, or some other name, but it was the agency from which the British Government bought her nickel, except that which came through the firm of Mond. Now, this firm was founded by Wilhelm Merton, of Frankfort, and from the day of its establishment it has spread its tentacles out, and the firm has grown every passing day. It is called Metallgesellschaft, the American Metal Company, the Australian Metal Company, the African Metal Company, Schweizerische Gesellschaft in Switzerland; it has a dual name which is sometimes French and sometimes something else; but it is always German in essence. It goes on step by step, putting up its outposts of empire, for that is what they were, in the great capitals of trade and the centres of the world. It pushed out its tentacles over Europe from place to place.

"It pushed another tentacle across the ocean to Australia, calling itself the Australian Metal Company; it called itself the Australian Metal Company, but it was not Australian metal. It was a company held by Germany; it had German directors, and very naturally, as was their custom, they covered themselves in their methods and devices with the cloak of naturalization. Bit by bit they beslobbered and entangled the great metal industries of Australia in a grip until they had them body and soul, and so it was that when the war broke out there was this great metal industry, the Beer Sondheimer in one shape or another, the Metallgesellschaft, and the Metallurgische Gesellschaft, the whole controlling the channels from which the metal came, determining how it should be produced and what prices it should be sold at all over the world. What they did in Australia they did elsewhere, and they did here. It is a great reflection upon you, it

is a tribute to your generosity and your hospitality, to your credulity, that you should have welcomed these men, that you should have given them ample opportunity to do that which they came here to do, and it is literally true that here, in Australia, and in America, they did control, for all practical purposes, the great metal industries of the world.

"In America they pushed out another tentacle; there was a company called the American Metal Company. It was a company in which, out of 70,000 called-up shares, 34,000, or 49 per cent., were held by the Metallgesellschaft at Frankfort, 27 per cent. by Mertons, of this place, and the remaining 18 per cent. were held mostly by hyphenated Germans, a few being held by bona-fide Americans, who were put right in the front of the shop window to deceive the credulous. Now I absolutely acquit here the English shareholders, the innocent shareholders in Mertons, of all blame. They went into this in a bona-fide way; they did not realize what were the designs of these people; but I am directing my remarks here against the firm, against the Metallurgische Gesellschaft, against the great German octopus which dominated the world, which stayed here for four years after the war, and which I say ought not to be allowed to exist here another hour. I have said that in Australia we turned them out and we interned their directors. There was a man who was a naturalized citizen, who applied for a writ of habeas corpus; I am glad to say he is still interned, and whatever comes or goes, Australia can stand on her two feet; German influence will not rise again there. I see that they have seized the firms of Beer Sondheimer and Aron Hirsch, and they are about to do the same thing for the American Metal Company*. They would have done so long ago but for the fact that Mertons, the English branch here, were permitted to carry on here. I do not think they will stay. They have already forfeited 49 per cent. of the shares held by the German shareholders of the Metallurgische Gesellschaft.

"This firm is all part and parcel; they call it an English firm. In law they are, but in essence they are not. They are agencies of the enemy; they are a menace to our commercial as well as our national safety. It is difficult to understand how they should have remained here. It is not sufficient to deny them a license; they ought not to be allowed to trade at all. Their company should be wound up, and they should disappear from the commercial life of the country. The Australian soldier did not wait in Australia for the onslaught of the enemy, and he came to France to fight the German where he was, and I, too, in my small way, am now fighting this great German metal octopus, and I want to enlist you here so that we shall get rid of these people. It is intolerable, after four years of war, when hundreds and thousands of our men have died in this great battle against Germany, that they should still be among us, not merely in ignorance, as it were, or as fugitives treading the earth, but people who are honored and respected, people of standing and in high places—it is intolerable, and ought not to be endured."—The New York Times, December 29, 1918.

*[This has already been done, as told in THE METAL INDUSTRY, August, 1918.—Ed.]

NEW BOOK

Electro Analysis. By Edgar F. Smith. Sixth Edition, revised and enlarged. Size 5½ by 7½ inches. 344 pages including index. 47 illustrations. Published by P. E. Blackiston & Sons. For sale by THE METAL INDUSTRY.

This sixth edition of this most important work contains a good deal of new matter and differs somewhat from the fifth edition in some of the schemes for the analysis electrolytically of the various elements. One new device which calls for particular notice is the improved double cup used for the determination of anions and cations. This device insures complete success and removes all doubt as to the accuracy of the results obtained in the examination of halides. Other additions to the text will be at once noted by the peruser so that we have in the present form the most recent and complete picture of the subject of electro-analysis.

ECHOES OF THE WAR AND STORIES OF PEACE

INNOCENTS ABROAD

To the Editor of THE METAL INDUSTRY:

"I can't describe how delighted I was when I received your letter.

Now, under the mournful sky, while sitting down on my bed-tick, in the squad tent, I stared around and found here a pencil and there a piece of paper and only one thing left to do, answer your letter.

Life, what is the life? Nothing—everything is nothing, but any way we like to live in the dusty world. I have not had a chance to be on a real battle field, but have done all that was required of me. Some of us, N. C. O.'s, privates and of course officers too, left behind for training purposes, had our hands full of work with new recruits that came overseas.

We left Boston, Mass., 8th of July and landed in Grays End (East docks) 23rd of July. The same day we arrived at Camp Winnal, north of Winchester. We rested for two days and had a good night's sleep, notwithstanding that cooties were advancing on us, from all directions, but their attacks were without success. On the 25th of said month, we left Camp Winnal, hiked to the station, boarded a train and after 20 minutes ride we arrived in Southampton. Late in the evening we boarded a ship which conveyed us across the English channel to historical France.

On the morning of the 26th of July we arrived in L'Havre (France) about 4, our ship anchoring in the port. Here we had our first feed of hardtack and coffee. This was some scene. Boys who were always in good homes, at comfortable tables, accustomed to having everything they desired, enjoying such a scanty fare. They cracked their first hardtack with bayonets, dipped in the hot coffee, but the hardtack was still the same. After a few minutes or so poor hardtacks were floating in the water around old Viper (name of old ship that we sailed across the channel). With empty stomachs, some of us, hiked about 6 to 7 kilometers, and arrived in the First American Rest Camp. There we had much better food. From there we began to go from place to place.

Some of us went to face those great odds, some remained behind for training purposes, when we finally arrived in the state of Cher. Then our company went on to Chavennes, from Chavennes to Chateaufort (Tur-cher). From Chateaufort to St. Aignan, from St. Aignan we hiked about 17 kilometers to Montrichard, and still there. Montrichard is an old historical town of France, and we visit very often the Chateau of Feodal of Montrichard (Lair-et-cher).

The castle of Montrichard was built in the year 1010 A. D. by the celebrated Foulques Nerra (The black hawk), a powerful French baron to protect his possession from the attack of his neighbors. The castle was built by the great architect Lisoie de Bozonger.

Among the notables who lived here or enjoyed the hospitality

of the castle can be mentioned: Luis the Haut; 1188, Philippe-Auguste; 1422, Dauphin Charles; 1427, Charles VII; 1461, Luis XI; 1589, Henry III; 1589, Henry IV; 1619, Marie de Medecis.

For over nine hundred years the splendid ruins of Montrichard has raised its stately mass over the peaceful valley of Cher.

The rainy season is our only present enemy; we suffer from it more than a man can imagine. The glorious mud shines like silver at night.

We are waiting now for the time when we will go back home to the good old U. S. A.

There is more to say about our voyage on the ocean and our other travels, but details will take too long to write.

CORP. FRANK TISHKINAS,
Co. G, 304th Inf.,
Army P. O. 773,
Amer. E. F.
MONTRICHARD, France,
Nov. 30, 1918.

[Corporal Tishkinas was a brass worker employed by the Scovill Manufacturing Company at Waterbury, Conn., before entering service.]



This Eagle Is from a Steel Engraving Published by Courtesy of J. B. Stimpson Company, Brooklyn, N. Y.

PARISIANS AND PEACE

To the Editor of THE METAL INDUSTRY:

I am writing this letter thinking that it might interest you to know how Paris took the announcement of the signing of the armistice. You know how New York took it, so you have one on me. When it was known that the signing of the armistice would be announced by the booming of guns, blowing of factory whistles and the ringing of bells at 11 o'clock on November 11, everyone was anxiously waiting for the first peal of thunder. It came as a shock, hardly to be realized. Within ten minutes factories had closed down and the people poured out. Happy? Yes!

The afternoon in Paris was a nightmare. People cried, sang, danced and kissed one another. Motion pictures were taken, but neither they nor words could thoroughly express the happiness of everyone. That night Paris stayed awake all night, and at 6 o'clock the next morning half of the people were still celebrating, and they were soon joined by more.

The afternoon of the 12th was still worse than the day before. People from the suburbs poured into the city. American soldiers had a holiday and drove around in trucks. Men of our outfit rode around Paris ringing a large bronze bell and called it the "Liberty Bell." Then in the

evening, when it became dark, the old and gay Paris was shocked by having its boulevards relighted and Paris had again become the joy of the Parisian.

Paris has stopped celebrating, has lost its noise, but has again become "Gay Parée."

It will, however, be months yet before I can ever hope to sail through New York harbor again, as much work is to be done over here.

SERGEANT JOSEPH HAAS, JR.

NOVEMBER 18, 1918,
Medical Repair Shop, No. 1, Post Office 702.

PEACE WITH VICTORY

BY GEORGE UPSHUR*

Joyous bells are ringing,
Happy voices singing,
And Washington's majestic soul
Is looking on with pride.
The Allies' banners flinging,
Tells the martyred Lincoln
In vain he has not died.
And Peace, with Victory, has come,
Proclaimed by trumpets' blare, and drum,
The World at last is free.
France and England's flags are thrown
In loving greetings round our own,
For all the World to see.
And untold millions raise the skies,
In loud acclaim unto our Lord,
That after all the sacrifice
The beaten foe has dropped the sword.

NOVEMBER 11, 1918.

*Great-great-grandson of Martha Washington, wife of George Washington.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

ASSOCIATE EDITORS: JESSE L. JONES, Metallurgical

PETER W. BLAIR, Mechanical

CHARLES H. PROCTOR, Plating-Chemical

ALLOYING

Q.—I shall be glad if you will let me know the composition of English coinage bronze?

A.—The composition of coinage bronze is as follows: Copper 95, tin 4, zinc 1. Bronze medals are often made of copper, and electro-bronzed afterwards for color.—W. T. F. Problem 2,652.

CASTING

Q.—We are die casting a piece with numerous small bosses or collar projections and have difficulty in filling the die, although we use plenty of force. The mixture consists of about 66 per cent. tin, 30 per cent. lead and 4 per cent. antimony. We have lubricated the die or mold with tallow, also paraffin, and have tried a little tallow in the mixture to clarify it, but cannot obtain uniform results. The casting should be smooth and sufficiently ductile to permit of a slight curvature after cooling. It should also be light as possible and susceptible of nickel plating.

Could you suggest any flux to clarify the metal or facilitate the flow to fill the die? Would you suggest a variation in the mixture and what proportions would you recommend? Could a small or any quantity of aluminum be added to lighten the product?

A.—We are of the opinion that if you will increase the size of the gate and cut down the antimony to 3 per cent. instead of 4, that you would have better success. We believe that the trouble is due more to lack of pressure than to any defect in the mechanical treatment of the mold or in the mixture, although we believe that reducing the antimony will tend to increase fluidity. It might be possible also that the mold can be a little better vented to allow the air which has been pocketed to escape. We also think that the lubricating material is satisfactory and that the trouble is evidently due to the failure to expel the air.—C. H. P. Problem 2,653.

DIPPING

Q.—We are manufacturing oil burners from red brass castings and would like to know of some solution to dip the castings in to clean them, both for appearance and for machining. We have been brushing them with a wire brush, but this does not give them a clean finished appearance.

A.—The production of a uniform bright color on red brass castings can be obtained by the following manipulations:

If the castings contain burned in sand pickle them in the following solution from thirty minutes to an hour.

Water 1 gallon
Commercial hydrofluoric acid 1 quart

Heat this solution to 120 degrees Fahr. Alcohol barrels sawed in two make good receptacles for this type of pickle or lead lined wooden tanks can be used. Earthenware or glass ware cannot be used.

After immersing in the above pickle for the time stated wash the castings thoroughly in cold water, then immerse in a solution prepared of

Nitric acid 38% 1 gallon
Sulphuric acid 66% 1 gallon
Water 1 quart
Muriatic acid 1 ounce

Immerse the castings in this solution for a few seconds or until the surface is clean and bright, then remove rapidly and wash thoroughly in cold water, follow by immersing in boiling water to which is added about ½ ounce of soap chips per gallon of water. If the articles are small follow the hot water with drying out in maple sawdust.

If the castings are oily or greasy then the castings should be cleaned in the following solution before immersing in the acid dip.

Water 1 gallon
Caustic soda 76/78% 4 ounces
Soda ash 58% 4 ounces
Powdered yellow rosin ¼ ounce

This solution should be maintained at a temperature of from 180 to 200 degrees Fahr. and should be heated in an iron tank or kettle. If the castings contain no burned-in sand the pickling operation may be omitted.—C. H. P. Problem 2,654.

FILTERING

Q.—What kind of a pump or filter pump can be used to filter a silver solution by fastening the pump to the tank? I have four 300 gallon tanks that need filtering and it is a long hard job to pour the solutions into another tank and filter by the old way.

A.—Any ordinary iron pump could be used for filtering a silver solution. Such a pump could be fastened to the tank and if power is available near the tanks the pumping could be done mechanically. Felt made in the form of cones could be used for filtering and these cones could be attached invertedly to the mouth of the pump. The filtering could be accomplished by this method without removing the solution from the tank.

Earthenware chemical pumps may also be used, also stone-ware pumps, but an ordinary iron pump will answer the purpose and it will be unacted upon by the solution.

Instead of the cone shape felt filter, a frame could be made up with wood and covered with several thickness of cheese cloth. Dirt and other accumulations in the solution would be readily separated by this method. The cheese cloth should not be stretched too tight on the frame, but should be left to sag considerable and the weight of the solution will assist in more rapid filtering.—C. H. P. Problem 2,655.

OXIDIZING

Q.—We have a quantity of mixed gun-metal and phosphor bronze swarf, and are very anxious to eliminate the phosphorus, which spoils the metal for castings, owing to the presence of zinc in the gun-metal.

A.—The elimination of phosphorus from the phosphor bronze swarf is not possible without losing some of the tin and copper also. By exposing the molten metal to the oxidising action of the atmosphere for some time, much of the phosphorus would be oxidised, but in addition a little nitre would greatly expedite its expulsion. The slag formed would, however, contain copper and tin, and should, if much of it were produced, be sold to a smelter.—W. T. F. Problem 2,656.

PLATING

Q.—I have some supposed to be cold rolled copper anodes and I am using them in an acid copper sulphate bath for electrotyping. Instead of working clean or with a little brownish oxide on the anodes with plenty of free acid, they are working with a jet black, very slimy coating which has a tendency to stick unless washed every day with a scrubber. The anodes seem as if they were insulated and cannot get the current through the bath on account of resistance. I know this must be due to impurities in the anodes, but could you tell me what the chief impurity is that copper anodes contain?

A.—We should suspect that there were some impurities, such as antimony or possibly some selenium in your copper anodes. Iron would not act the way you describe. What we would sug-

gest is that you have a sample of the anode analyzed and that will give you a clue as to what the difficulty is.

Should the anodes happen to be hot rolled instead of cold rolled it is possible that there is some arsenic in them.—K. Problem 2,657.

POLISHING

Q.—Can you furnish us with full information and data as to the arrangement of suction and discharge pipes for a grinding and polishing installation?

A.—In the case of the undershot wheels (the top of the wheel running towards the operator which is invariably the direction of the rotation of emery polishing and buffing wheels) the main suction should be back of and below the wheels and as close to them as practicable. Sometimes it is preferable to fasten the suction duct to the ceiling of the floor below. Both the main suction and discharge pipes should be short and have as few bends as possible to avoid frictional losses. If one or the other must be of considerable length it is better to place the fan quite close to the nearest branch pipe which enters the large end of the main as a long discharge pipe is preferable to a long suction pipe. Avoid any pockets or low places in the ducts where dust might accumulate. The main suction duct should be enlarged between every branch pipe entering it and in no case should it receive more than two branches in a section of uniform area.

All enlargements in the size of the main suction duct should be made by tapering it and not by an abrupt change of diameter.—P. W. B. Problem 2,658.

Q.—We have quite a few small flat pieces of hard cold rolled strip steel to be polished. These pieces are 5/8 inch wide by 2 inches long and 22 gauge. We wish to get a real high polish on these strips such as that on fine machinist tools.

A.—In order to produce a high lustre upon the strips of steel of the dimensions outlined, it will be necessary to make at least four operations of the polishing. The polishing wheels may be of tampico or wooden wheels covered with leather and emery or carborundum of the grades outlined.

Small chucks to hold the pieces of steel can be made from hard wood and a piece of the steel heated to redness and then laid evenly on the hard wood, thus burning into the wood sufficiently to hold the steel so that it can be polished.

Manipulations should be as follows:—If the steel is smooth and free from deep scratches, start with 120 emery. If tampico wheels are used the correct grade of emery or carborundum may be purchased in cake form. If wooden wheels are used the emery must be applied to the leather covered wood wheels by means of a suitable glue. The glue should be first applied to the leather and then the wheel rolled in the emery and allowed to dry for twenty-four hours. Next polish down with 180 emery or paste and then with flour emery or paste.

Finally polish on cloth buffs with tripoli and color with white composition. If you will follow the above directions you will obtain a good high lustre on the steel. Possibly the polishing can be accomplished in a less number of operations, but this can be determined by experimenting only.—C. H. P. Problem 2,659.

REDUCING

Q.—What is the flux for reducing 10K, 14K and 18K gold filings? I wish to get the gold in such shape that it may be realloyed. I have been using salt and saltpetre, but do not know what are the best proportions and have had but moderate success. Sometimes the gold comes out very poor in quality indicating that a great deal of the alloy has not been oxidized. I have difficulty with the crucibles breaking. Kindly tell me how to anneal black lead crucibles. I have been using sand crucibles.

A.—The electrolytic method of refining is by far the best and most economical method that can be used. While it is not practicable for a small firm there is no reason why filings, etc., cannot be deposited as bullion at a government mint or assay office. Such a method should be as satisfactory

as the usual wet or fire refining, for acids and crucibles are now very expensive and difficult to obtain.

If fire refining is used the filings should be tested with the magnet and if any iron is present it should be removed.

The filings, if clean, can be melted down with borax. If saltpetre is used in connection with salt its amount should be kept as low as possible because it attacks black lead crucibles very energetically. If a considerable amount of base metals is to be removed the saltpetre can be added at intervals and in small doses. An air blast is sometimes of service in assisting in the removal of impurities.

Black lead crucibles are usually annealed by setting them in a slow coke fire, upside down. They should be stored in a dry warm place when received and kept there until used.—J. L. J. Problem 2,660.

REFINING

Q.—In running down scrap white metals, such as babbitt solders and other tin bearing stock, into pigs, we have considerable trouble in keeping it free of zinc. Can you advise how we can overcome this trouble?

A.—In an article published in THE METAL INDUSTRY for February, 1916, Adolph Bregman, who is an expert on the subject of refining white metals, states that the best way to get rid of zinc from such material is to use sulphur. He says that after the zinc has been drawn to the top of the metal bath by means of sulphur that resin is used and changes the dross to such a condition that it can be easily skimmed off.—K. Problem 2,661.

REMELTING

Q.—We have large quantities of scrap zinc to remelt into ingots, and this we do in oil-fired crucible furnaces. Will you please inform us of the main general points to observe as to temperature, and the reduction to the lowest possible limits of oxidation. Also, is it best to charge the crucibles to their capacity first, or melt a little zinc, and feed? Notwithstanding the use of flux we find oxidation and the formation of zincy scum a difficult point and a matter of loss.

A.—The temperature should not exceed 500 degrees Cent. This will be the surest check on oxidation, which increases with rise of temperature. It would be advisable to melt only a small portion at first, and feed fresh metal continuously, as each addition is dissolved in the bath. Keep your flame reducing in character if possible. Keep a cover of flux on the surface all the time. Any hard scum due to impurities such as iron should be sold or treated separately.—W. T. F. Problem 2,662.

SOLDERING

Q.—We enclose herewith a sample of aluminum jig that we use for holding a brass shell and tube together for soldering purposes. Is there any other metal that we could use instead of aluminum? The aluminum is very soft and jigs become damaged with very little use. Is there any process for treating steel that would prevent it from taking the solder?

A.—If cast iron is strong enough to serve as a jig it will be satisfactory from the standpoint of not taking the solder. Cast iron contains several per cent. of graphitic carbon and until this is removed from the surface of a cast iron article it cannot be soldered or brazed. Malleable iron would be stronger and tougher than cast iron and if you removed the outside skin to the depth of, say, 1/64 of an inch or, in other words, until you came to the graphitized portion of the metal you would have a stronger jig than one made of cast iron and it would not take the solder. The skin portion of a malleable iron casting, however, is decarbonized and for this reason may be tinned or soldered like steel.

If steel is well rusted it will not take the solder or if it is dipped in clay wash frequently. Dipping in oil and then carbonizing the oil on the steel might also answer.

Sheet magnalium which contains about 95 per cent. aluminum and 5 per cent. magnesium is stiffer and stronger than aluminum and ought to be more satisfactory than the sheet aluminum you are now using.—J. L. J. Problem 2,663.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

The age of these patent notices is due to the delay in the issuing of patent reports.—Ed.

1,281,126. October 8, 1918. **Solder or the Like and Process for Preparing the Same.** A. P. Bevan. Tavistock, England.

This invention relates to an improved solder which has many advantages over the usual commercial solder. For instance, the improved solder does not tend to form globules in the manner of ordinary solder when worked on a dirty or greasy surface, and it may be worked over holes of considerable size without any support, the solder being manipulated with a hot iron in the usual manner.

It may also be used for aiding the tinning of bad surfaces, while its manufacture is economical or even more so than ordinary solder. A further feature of great importance is the fact that the solder does not become liquid at the soldering temperature but remains in a plastic state.

In preparing the solder in one method, the inventor takes ordinary solder and incorporates with it a finely divided metal such as copper or an alloy such as a brass alloy, care being taken when the solder and the finely divided metal are being heated together that no fusion or solution of the finely divided metal takes place so as to prevent an alloy forming between the finely divided metal and the solder. It is preferable that the metal or alloy constituent which has the higher fusing temperature be incorporated in a very finely divided or pulverulent form, though a serviceable solder for rough work is produced with this constituent in the form of coarse filing or shavings.

1,281,262. October 15, 1918. **Process of Coating with Precious Metal.** Felix O. Andrews, San Francisco, Cal.

The present invention relates to improvements in the art of applying gold or like metal to glass surfaces, such as display signs or the like, and the invention has for its principal objects to dispense with the necessity of applying the gold in leaf form and by the aid of a brush, which is the present process, and by so doing reducing the cost of manufacture of the coated article and increasing the output of the establishments for this purpose; to provide a method whereby the coating is applied in a liquid form and in an even, unbroken film or surface of uniform color, thereby overcoming the joint lines and patches which are present when the leaf is applied by the present brush process, and overcoming the objection of the coating or film being in various colors due to the different shades of the respective leaves applied; and to provide a method whereby the coating after being applied may be toned or darkened, if desired.

1,281,371. October 15, 1918. **Apparatus for Applying Abrasive to Grinding Machines.** H. K. Hitchcock, Pittsburgh, Pa.

One object of the present invention is to provide apparatus, as shown in cut, whereby a measured charge of abrasive material sufficient for completing a single grinding operation, such as facing and finishing a side of glass, may be applied as a single batch or portion and repeatedly circulated in suspension in a liquid from the grinding table to the grader and back again, being thereby gradually reduced to finer and finer grades which are supplied to the

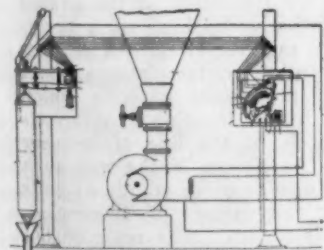
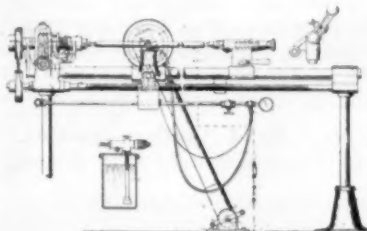


table in turn as the grinding operation requires finer and finer abrasive, thereby increasing the efficiency and shorten-

ing the time of the grinding operation, avoiding liability of defects in the surface being ground, reducing the quantity and consequently the cost of the sand used, and also conserving the fine sand for finishing operations.

1,281,672. October 15, 1918. **Lacquering Machine.** Anthony Schorn, Kenosha, Wis., assignor to Simmons Company, of the same place.

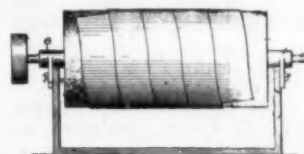
This invention relates to improvements in lacquering machines and refers more particularly to a machine of that type in which the lacquer is applied to the article to be coated by means of an atomizer or in the form of a jet and in which said surplus lacquer is removed from the article in question by suction. Among the salient objects of the invention are to provide in



a construction, as shown in cut, of the character referred to, novel means for collecting and saving the surplus lacquer which is applied to the tube or other article to be coated; to provide in a construction of the character last referred to, a novel collector device interposed in the path of the suction current and so arranged that the solid portions of the lacquer are collected and saved without interfering with the withdrawal of the fumes or other gaseous vapors from the vicinity of the lacquering machine.

1,282,262. October 22, 1918. **Electrolytic Process.** M. M. Merritt, Danvers, Mass., assignor to Copper Products Company, Boston, Mass.

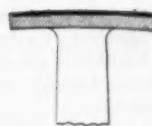
This invention pertains to improvements in electrolytic processes, more particularly, though not exclusively, to improvements in the manufacture of copper or other metallic sheets by electro-deposition on a rotating cathode, as shown in the cut.



Among other objects of the invention are to provide a method of depositing such sheets at a relatively rapid rate, of uniform thickness, of smooth and uniform texture and close grain, and of great tensile strength.

It has been found that by proper correlation of the proportion of the surface of the cathode which is immersed to the speed at which the cathode is rotated, the formation of rough deposits

on the deposited sheet caused by liberated hydrogen may be reduced to a minimum and indeed substantially eliminated, while the so-called "burning" of the deposits by the use of a high current density may be avoided, while maintaining that rapid rate of deposit which results from the use of such high current density.



1,282,055. October 22, 1918. **Noble-Metal Alloy.** G. H. Dufour, Oak Park, Ill., assignor to Marshall Field & Company, Chicago, Ill.

This invention relates to an alloy of metals, and has for its object to produce a composite metal having definite and permanent characteristics that render it suitable for use in the manufacture of jewelry and other articles for the production of which noble metals or precious metals are gen-

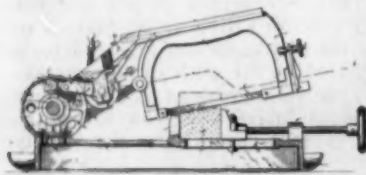
erally employed. More particularly, the object is to produce a metal that will have those inherent qualities which render the metal platinum, desirable for the purposes above mentioned, such, for instance, as high ductility and malleability which facilitate working the metal into any desired form of stock materials or any special shape and design of article to be produced; attractive appearance due to natural color, and reception of polish or special finish; physical and chemical properties which adapt it to resist abrasion and ordinary acids or other oxidizing influences, and consequent capacity for retaining its appearance.

The new alloy is composed of three metals, each a noble metal in itself, namely, gold, palladium, and platinum, with the first named commercially plentiful metal largely in excess, and with the rarer metals in comparatively small proportions, though sufficient in quantity to definitely change the appearance of the gold to that of platinum, and lend the necessary hardness to the compound.

In general terms, the gold may be said to be about 74%, the palladium about 21½%, and the platinum about 4½% of the alloy.

1,282,394. October 22, 1918. **Metal Cutting Machine.** Charles H. Driver, of Racine, Wis., assignor to J. M. Jones, of the same place.

This invention relates to new and useful improvements in metallic cutting machines, particularly to that type known as power hack saws.



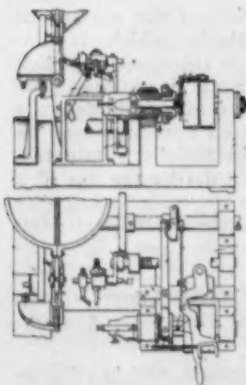
Inasmuch as it is extremely detrimental to the teeth of a saw to have the cutting edge dragged over the work which is being operated upon the non-cutting stroke of said saw, it is primarily an object of the present invention to

provide means, as shown in cut, for raising the saw blade out of engagement with the work material immediately at the termination of the cutting stroke so that on the non-cutting stroke there will be no contact between the saw teeth and material which it is adapted to cut.

Still another object of this invention is to provide means for automatically feeding the saw blade to the work material and returning it from the raised position assumed during the non-cutting stroke into engagement with the work-material or stock.

1,282,496. October 22, 1918. **Automatic Metal-Working Machine.** H. P. Townsend, Hartford, Conn., assignor to H. P. Townsend Manufacturing Company of the same place.

This invention relates more especially to that type of metal working machines in which the articles being formed are held in a chuck, and an object of the invention, among others, is to provide such a machine with means for preventing any but perfect blanks or blanks of proper size and form from being operated upon by the machine.



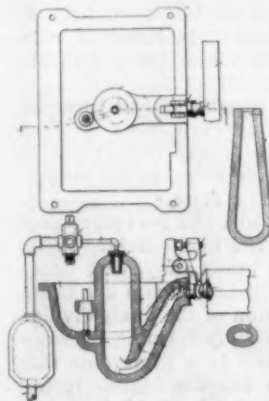
A satisfactory construction of machine embodying the invention and in the production and use of which the objects herein set out, as well as others, may be attained, is illustrated in the accompanying drawings.

In the operation of machines of the class herein referred to, in order to produce satisfactory work much time is required to properly adjust and set the parts, this applying especially to the tools and feeding devices. Should an imperfect blank or a blank of improper size be permitted to enter the chuck, the tools or other parts of the machine acting upon the blank will at once become dis-

arranged or broken, requiring readjustment and resetting and causing much loss of time. The improved machine, herein illustrated, is provided with means for preventing imperfect blanks or blanks of improper size and form from getting into the chuck, or for preventing operation of the tools upon such blanks as may find their way into the chuck, the machine, in either case, being promptly stopped.

1,282,963. October 29, 1918. **Metal-Casting Apparatus.** Fred Shroder, Chicago, Ill., assignor to the Stewart Manufacturing Company, of the same place.

The purpose of this invention is to provide an improved construction of metal casting devices, particularly for the purpose of die casting, and particularly relating to the melting pot or crucible for furnishing molten metal to the die or mold. It consists in the elements and features of construction shown and described, as indicated in the cut.

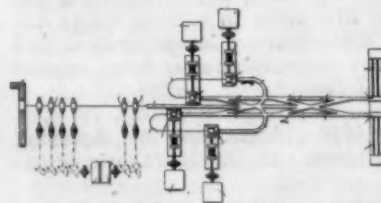


The patent covers:

In a metal casting apparatus, in combination with a melting pot and a well therein adapted to be filled by gravity to the level of metal in the melting pot, and a discharge duct leading from the bottom of the well upward for discharge at a point above the liquid level of the pot, whereby such discharge may be valveless; means for forcing the metal out of the well for discharge through said duct, consisting of a conduit from a source of compressed air leading into the top of the well, whereby the metal is forced from the well by a fluid pressure acting upon the surface of the liquid metal in the well, the wall of the well at the side at which the duct leads up therefrom being deflected inward with respect to the well forming a tongue protruding under the upper part of the well cavity and forming a partial bottom for the well at the side toward and immediately above the inlet mouth of the duct.

1,283,727. November 5, 1918. **Rolling Mill.** Jerome R. George, of Worcester, Massachusetts, assignor to Morgan Construction Company, of Worcester, Massachusetts, a corporation of Massachusetts.

Among the objects of this invention is to increase the capacity of rolling mills, particularly merchant mills, and to enable the product of such a mill to be varied in size and dimension, the treatment of said product being continuous, as in the usual form of mill, from the heating furnace to the cooling bed on which the product is finally received.



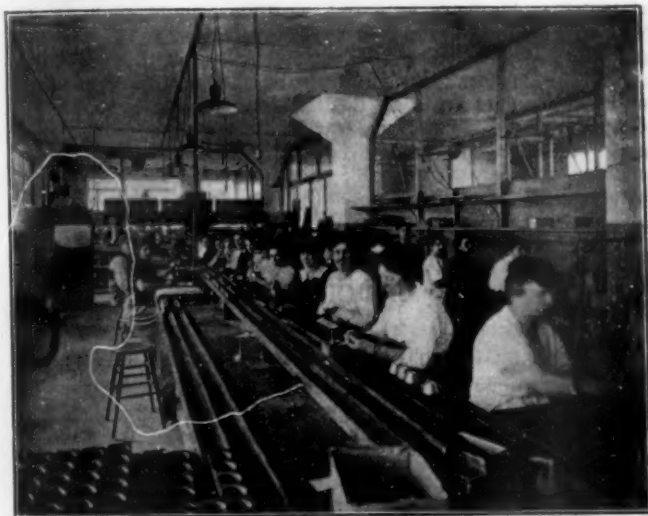
In common with other mills the present invention contemplates, among other things, the treatment of the heated metal in a train of rolls constituting a finishing train therefor, previous to the delivery of said metal onto a cooling bed. However, the present invention contemplates a novel disposition and arrangement of the stands of rolls which constitute such a finishing train, by the location of said rolls at one side or the other, or both, of the line of delivery of the metal through a guide. As shown in the cut, such a finishing train may consist of one or more stands of rolls and in the present instance, for convenience of illustration, only one each of such stands is shown. The rolls of the stand or stands are capable of rotation by suitable gearing from an independent prime mover, such as a motor to move the metal in a direction opposite to its passage through the guide.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

A CANADIAN MUNITION FACTORY

Canadian manufacturing plants found the munitions industry a useful bridge between the initial stagnation caused by the war and the tremendous demand for manufactured articles which was forecasted for the end of hostilities. Even more important than that is the state of perfection in equipment and operation which the most of these plants reached in order to meet the demands of the allied governments for absolutely reliable shells, fuses and other munitions of war. When the war began, some of the plants in Canada were naturally more prepared for big business than others, but it must be admitted that the firm of Lymburner, Ltd., the well-known Montreal brass goods manufacturers, was not one of these. It was, in fact, a small brass factory employing from 100 to 125 employees, with no particular facilities, and with a capital amounting to not more than \$75,000, but with a reputation above reproach in the manufacturing business of Montreal.



ASSEMBLY ROOM FOR FUSES AT LYMBURNERS, LTD.,
MONTREAL, CAN.

At the head of this small brass foundry and machine shop was a man with vision, integrity and foresight to see opportunities and with the courage to grasp them. That is what L. M. Lymburner did, and without hesitation he began to enlarge his plant. He installed new machinery and tools, and then reorganized his operating staff on a larger scale. How many thousands or even tens of thousands of dollars were spent in this way is only known to Mr. Lymburner and his associates. When the plant was completed, everything ready for operation and big business, its representatives just went out and collected contracts, and they had nothing to hamper them in any manner, as they were fully equipped to deliver the goods. This was the latter part of 1914. Since then the company of Lymburner, Ltd., has at times achieved a monthly output of more than 175,000 shells and 300,000 fuses, and this output has been accompanied by a standard of quality. The company's assets have grown until they are now \$500,000, with current liabilities of only \$80,000.

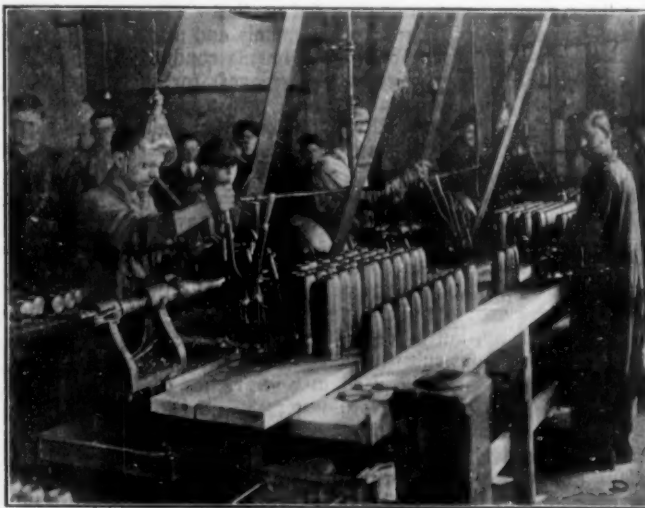
There is a place in the plant for everything and everything is in its place. Each department has its own quarters, well lighted, aired and heated for the health and comfort of the employees. For the women employees there is a recreation and rest room, where they can eat their lunch, read, write, or pass their leisure time in any reasonable way. There is also a miniature hospital with a qualified doctor and a graduate nurse in attendance where any of the employees who may unfortunately be injured can receive attention.

The main body and most of the component parts of the time fuses which this concern manufactures are brass forgings. The time fuse is a very intricate piece of mechanism

and is used for the bursting of the shrapnel shell of the 18 pounder field gun, and as the name implies, does this at a definite time as set by the gun operator. To obtain the necessary accuracy all the different operations of machining and assembling must be very accurate in order to pass the government inspection to which they are subject.

The general managership of the plant is in the hands of E. Halley, who may be safely credited with a considerable share in the progress made by the firm. Mr. Halley was at one time machinist with the United Shoe Machinery Company, afterwards accepting a position as inspector with the Montreal Light, Heat and Power Company. He came to Lymburner, Ltd., as purchasing agent in September, 1913, and his ability and energy speedily brought him to his present responsible position, and he now controls a plant having 2,000 employees, with a capacity at the present time of 10,000 shells a day.

The whole spirit of Lymburner, Ltd., from the president down to the junior employee, is one of enthusiasm fostered



COPPER DRIVING BAND TURNING MACHINES AT LYMBURNERS, LTD.

by generous treatment from the management, and met by unstinted co-operation from the staff.

This Canadian brass plant, now that hostilities have ceased, will be able to take up its regular line of brass goods on a larger and more efficient scale, as they have demonstrated what can be accomplished in times of great necessity.

BAKED-ON METAL FINISHES

Baked-on finishes are claimed to be so much more durable and retain their glossiness so much better than air-dried paint, that the establishment of a plant especially to do this work, is worth noting and remembering. Readers, who may now, or in the future, be considering the question of baked-on finishing rust-proofing, etc., of metal products, machines, stands, etc., will do well to communicate with the Enameling & Stamping Corporation of N. Y. (telephone Astoria 1474), 2nd and Webster avenues, Long Island City.

This new company has acquired the plant of the Fickling Enameling Corporation and has re-equipped it fully with all up-to-date appliances, to handle an enormous volume of work of different kinds. It is said to have the largest capacity of any plant of the kind in the East.

The company is equipped to handle with thoroughness and economy all forms of baked-on finishings or re-finishings such as mentioned above. It does not do high temperature vitreous porcelain enamel, but applies baked-on coatings of all kinds up to 400 to 600 degrees, including transparent rust-proofing, acid proofing, etc. It does not make any products of its own, but devotes itself entirely to those of other manufacturers.

TIN SUBSTITUTES

By H. P. WHITE*

The circular letter issued last May by George Armsby, chief of the tin section, War Industries Board, calling attention to the limited supply of tin available in the world, the hazard involved in connection with our oversea imports upon which we were dependent for our requirements, the imperative necessity of conserving tin to the fullest extent possible, and suggesting that all waste be eliminated, other metals substituted for tin wherever possible, the percentage of tin used in various alloys be reduced to the fullest extent possible, and that larger quantities be recovered, has led to a very thorough investigation of the subject of tin substitutes.

There is no doubt but that a large number of the consumers of tin conducted numerous experiments on this subject, each along the line which promised the best results for his particular field of business; and it is reasonable to suppose that the knowledge obtained from such experimental work would often be of such character as to give the discoverer an advantage over his competitors; and, for this reason, it is quite likely that a large amount of valuable information on the subject has not been published. But many valuable discoveries relating to the substitution of other metals and alloys for tin have been published for the common benefit of interested parties.

The subject of substituting other metals and alloys for tin had been closely studied and many experiments conducted along that line before the Government's special request for such investigation, and tin substitutes had been in use in the United States for several years before the European war; but the Government's request greatly stimulated such research and also created a demand for such products.

Magnesium, aluminum, antimony, cadmium, and metallic phosphorus are among the metals and alloys that have attracted public attention as tin substitutes. Each of these products are practical substitutes for tin in some of the innumerable departments in which tin is used, but none of them will take the place of tin in a general sense; that is, none of them can safely be wholly substituted for tin, but a certain per cent. of the tin specified in any formula may be substituted by some one of them; but no one of them can safely be used in all varieties of formulas, as each has its special field of usefulness.

Magnesium, aluminum, antimony and cadmium each in its elemental form may be employed as a partial substitute for tin in certain mixtures. Their principal field for such use is, magnesium and antimony, in babbitts; aluminum, in composition bronze formulas; cadmium, in solders. Metallic phosphorus is an alloy that has been for several years employed as a partial substitute for tin, phosphorus tin, and phosphorus copper, in tin bronze, phosphorus bronze, manganese bronze, composition bronze, both white and yellow brass and babbitts.

There is no doubt that a proper use of the tin substitutes will produce satisfactory results in a majority of metallic alloys; and although the war is practically ended, it is evident that the practice of using other metals and alloys in place of a certain per cent. of the tin specified in solder, babbitt, brass and bronze formulas, will be continued. As there is economy in such practice, many foundrymen claim that they secure a superior quality of castings by this practice. A still stronger incentive for it is the fact that a majority of the tin substitutes are United States products, while nearly all of our tin has to be imported.

In view of the above facts, foundry superintendents who have been employed on work which did not admit of the use of tin substitutes might be interested, at this time, to receive information relating to such practice.

For information regarding the use of cadmium as a substitute for tin in solder, the writer would refer to an article on page 412 of the September, 1918, issue of THE METAL INDUSTRY; and information regarding the use of magnesium as a substitute for tin could doubtless be secured by addressing C. W. Leavitt & Company, 34 Church street, New York. They are headquarters for that product and would no doubt be able to provide very complete information regarding its different fields of usefulness.

So far as the writer knows, the usefulness of antimony, in its elemental state, as a tin substitute is confined to the manufacture of babbitts; and the most reliable information regarding the

use of aluminum as a tin substitute could no doubt be obtained from the Aluminum Company of America.

As a tin substitute, metallic phosphorus seems to cover a very broad and varied field of service; and when used as a substitute for tin, one pound of metallic phosphorus takes the place of two and one-half pounds of tin.

In babbitts, from one-eighth to seven-eighths of the tin specified may be substituted for with metallic phosphorus.

In brass castings, from one-half to the whole amount of the tin specified may be substituted for with metallic phosphorus.

In plain tin bronze, one-quarter of the tin specified may be substituted for with metallic phosphorus.

In phosphorus bronze, one-quarter of the tin and one-half of the phosphorus tin or phosphorus copper may be substituted for with metallic phosphorus.

In composition bronze, from one-quarter to three-quarters of the tin specified may be substituted for with metallic phosphorus.

As one pound of metallic phosphorus takes the place of two and one-half pounds of tin, phosphorus tin, or phosphorus copper, it follows that one and one-half pounds of some of the other elements of the mixture should be added to balance the formula. The character of the mixture to determine which of its constituent elements should be added.

Parties desiring more specific information regarding the use of metallic phosphorus as a tin substitute, should apply to the New Era Manufacturing Company, Inc., Kalamazoo, Mich. They are headquarters for this product and will send, free, to interested parties a formula circular containing over 40 practical commercial formulae covering the following subjects: tin bronze, phosphorus bronze, composition bronze, gun metal, and manganese mixtures. Each formula is given in its regular commercial form and also rewritten with metallic phosphorus substituted for a part of the tin, phosphorus tin and phosphorus copper.

HOW TO BUILD AN ANNEALING OVEN FOR CRUCIBLES

By A. C. SORENSON, IN THE DECEMBER 1918 "GRAPHITE" PUBLISHED BY THE JOSEPH DIXON COMPANY, JERSEY CITY, N. J.

The ideal annealing furnace consists of two chambers and the size depends upon the amount of crucibles used. We have in mind a concern which buys crucibles by the carload and has built the latest up-to-date annealing plant possible. It consists of two rooms side by side, each one large enough to contain a carload of crucibles. The heating in this case is done by steam-pipes around the walls sufficient to raise the temperature in the room gradually to 300 degrees; and when a fresh car of crucibles is received, they are put in one of these rooms and the heat turned on and gradually raised until at the end of a week or 10 days it has reached the 300 degrees point and eliminated all the moisture from the crucibles. They are kept in this atmosphere until they are all used up, and in the meantime, when another car of crucibles comes in, it is put in the second oven—the reason for this being that if they were to put the fresh car of crucibles in with some of the seasoned ones, the moisture in the new ones would counteract all the good effect which the previous heat had done. This is the reason for having two ovens.

After it is taken into consideration that a crucible which comes out of our kilns contains as little as one-quarter of one per cent. of moisture, as soon as it cools and comes in contact with the atmosphere it is liable to gather as much as 6 per cent., which would mean that in a crucible weighing 100 pounds there would be nearly one gallon of water absorbed, so if this "green" crucible is placed in an oven where the dry ones are, you can readily see what would happen.

It furthermore is necessary that some ventilation be arranged in an annealing oven of this kind. One opening at the top on one side of the oven and another opening at the bottom in the opposite side of the oven allows for the circulation of air which is necessary to carry the moisture away. What we have said in regard to a plant to take care of a carload of crucibles is equally true in regard to a smaller quantity. The principle involved is the same, and the results in increased life of crucibles will certainly pay the expense involved in installing this kind of a plant.

NAPIER METAL BAND SAW MACHINE

The sawing of metals is performed in ordinary practice by three different types of saw: The circular saw with its wide blade which wastes metal, and by the hack saw machine which, due to the reciprocating stroke, is far from being an efficient tool, and by the metal band saw which overcomes the main objections to the two types of tools previously mentioned, and, in addition, has the advantage of being a machine which cuts fast and straight, and with a low maintenance cost.

The manufacturers of the machine shown in the cut, the Napier Saw Works, Inc., Springfield, Mass., say that: "The Napier band saw machine is the latest and best band saw machine. It is the ideal continuous stroke hack saw put into actual operation in a practical machine tool. The designer of this machine is correct in principle, and around the principle governing this machine there has been designed a rigid and durable tool which will give a lifetime of hard, continuous service in any shop. The Napier band saw machine is designed to carry a 1-inch band. The width of the band assures straight cutting with proper feeding weights and speeds, with practically no breakage of the band saws. The band saws on this machine wear out before they break. The head of this machine which rotates about the driving shaft is perfectly balanced so that



THE NAPIER METAL BAND SAW.

there is a constant feeding weight from the start to finish of any cut which can be made on the machine. This refinement in the design permits the band saw to be operated at high efficiency at all times, and is largely responsible for the success which this machine has attained.

"Special attention has also been given to the design of the guides so that there is no wear on the saw or breakage caused by loss of adjustment or other cause.

"The machine consists of very few principal parts. There is the base in which the tank containing the lubricant for the saw is placed. This base carries the housings for the main shaft of the machine and the cabinet carries the vise. On the main shaft of the machine is mounted the driving pulley, the clutch, the pinion driving gear, and the bearing around which the tilting head rotates. The tilting head carries two wheels, the truss arms and guides, and the spring is placed in such a position that the feeding weight is constant from the start to finish of any cut. The tension in this spring may be regulated by a hand wheel, thus varying the feeding weight. The cutting band is lower than the running band, thus making it possible to cut off any length required. By means of the guides on the truss arms, the band saw blade is directed so that its travel between the guides is absolutely vertical, thus assuring of straight cutting

and saving of material. These guides once set are in perfect adjustment for any saw which may be placed on a machine.

OPERATION.

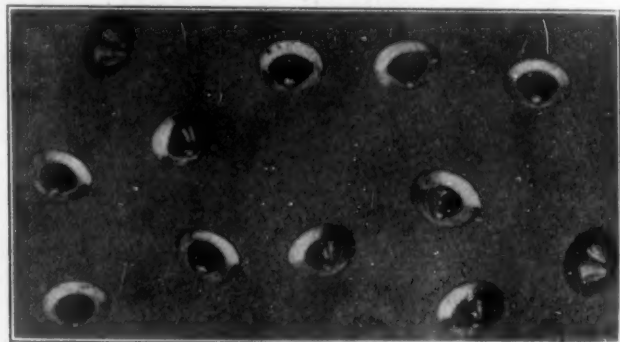
"The Napier saw machine is simple to operate. Lock the work in the vise, adjust the saw to cut toward the rear of machine, start the saw, adjust the flow of the cutting compound, release the tilting head and lower it gently until the saw engages the work and the saw will do the rest.

"Quality metal band saws are furnished with the Napier saw machine. These saws have now been so perfected that by their use the low cost of metal band sawing and large production makes them a necessity in any factory. 'Quality' metal band saws, on a Napier band saw wear out before they break.

"The Napier band saw is a general purpose machine which will cut metal at good rates of speed at low costs for saw blades and at a low maintenance rate on the machine. It is a tool which is especially appreciated in the tool room of any general manufacturing concern where there are all varieties and sizes of material to be cut."

ABBOTT BURNISHING CONES

The Abbott Ball Co., Hartford, Conn., is now turning out a new style of burnishing material known as burnishing cones, these being intended for use in connection with burnishing balls for getting into small crevices or for figured work. These cones take the form of a flat disk with a small cone protruding from



ABBOTT BURNISHING CONES.

either side, and on account of this shape either the edge of the disk or the point of one of the cones will come in contact with the work and will reach into small sharp corners. The cones are about $\frac{1}{4}$ in. in diameter, the illustration showing them somewhat larger than they actually are.

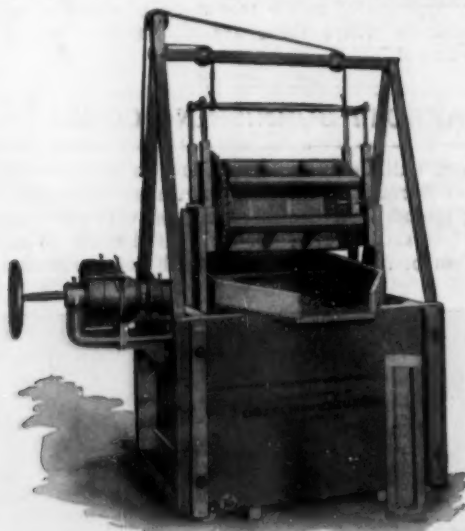
GENERAL PLATERS' SUPPLY COMPANY

This company announces that the growth of their business during the past two years has made it necessary to obtain very much larger quarters and that in their new building they have greatly enlarged their manufacturing facilities, especially those for making buff and polishing compositions. Besides the building they occupy in New York, which is especially devoted to the manufacture of plating and polishing materials and apparatus, they have a foundry at Saugerties, N. Y., for the manufacture of nickel, brass and copper anodes. Their sheet metal plant at Port Morris, N. Y., is especially equipped to make tanks and sheet metal work in general.

In conformance with the stride and progress this company has set itself, they have just lately issued a fully illustrated catalog of plating and polishing materials, as well as the apparatus used in conjunction with plating and polishing. Many hundreds of copies of this catalog have already been distributed but if you have not received a copy, it will be well worth your while to address the General Platers' Supply Company at 489-493 Broome street, New York for one. The catalog contains much useful information of great benefit to the polisher and plater.

RELiance MECHANICAL PLATING BARREL

The apparatus shown in the cut is known as the Reliance mechanical plating barrel manufactured by Chas. F. L'Hommiedieu & Sons Company, Chicago, Ill. The barrel, when in operation, is completely submerged in the solution and is three-quarters filled with work and when the articles are ready to be taken out, the barrel is lifted over the tank and held at any desired height by a dog catch, the panel door is then opened and the contents emptied on a tray over the tank, doing away with any drip of solution on the floor. The manufacturers state that by the use of the lifting device considerable time is saved in loading and unloading the work in the barrel. The barrel can be lowered into the tank by pressing the finger on the little dog catch under the gears. The wooden tank is made of 3 inch fir, lined with asphaltum



THE RELIANCE PLATING BARREL.

and is made in one size, 38 by 26 by 30 inches. A device is bolted on the tank for lifting, operating and dumping the contents. The cylinder, or barrel is 24 by 12 inches, inside measurements and is made of maple wood having six asbestos wood perforated panels, which can be readily removed or replaced when desired. In order to eliminate all deposit of metal on the mechanical parts, the steel parts are insulated by a wooden covering. The rings inside of the barrel are connected to the dynamo and carry the current to the contents of the barrel. These contact rings, it is stated, can be removed whenever the deposit becomes sufficient to require it.

The manufacturers also state that this mechanical plating barrel can be made up in larger sizes whenever required and that the sizes of the perforations can also be furnished as desired. Further particulars regarding this barrel can be obtained by corresponding with the above company.

CROWN SEDIMENT REMOVER

The removal of the slime or sediment that accumulates at the bottom of a nickel solution has always been one of the great problems with which the nickel plater has had to contend. The method heretofore practiced has been to dip or syphon out the solution and then shovel out the sediment, a tedious and expensive operation.

The Crown sediment remover works automatically. At the bottom of the container is a trap door which remains closed while the device is being forced through the solution. When at the bottom of the tank, a connecting wire opens the trap door and at the same time the operator opens the valve at the top end of the pipe and the sediment is sucked into the receiver.

The remover is then withdrawn and emptied. This operation can be repeated until all of the sediment is removed. An opening with a cap is provided at the side of the receiver,

by removing the cap the sediment can be dumped into a barrel or other vessel, allowed to settle and the clear solution returned to the tank. The remover is manufactured by the Crown Rheostat and Supply Company, Chicago, Ill.

A PNEUMATIC CLEANER

The tool shown in the cut is known as the "Branford" pneumatic cleaner and sprayer and is a new combination for foundry and shop use. Some of the things claimed for this apparatus by the Malleable Iron Fittings Company, Branford, Conn., are: it is simple, indestructible, efficient and economical. It sprays all liquids with equal facility and can be used either as a sprayer or plain air jet without changing



A PNEUMATIC CLEANER.

a single connection. It can be used in the foundry for cleaning patterns, benches, flasks, etc., and for spraying molds and for spraying cores with graphite. In the machine shop it can be used for cleaning machines, tools, jigs, gear boxes, etc., used with a benzine or kerosene spray. The sprayer or cleaner will clean long standing accumulations of oil and dust and will clean in any position and place that can be reached by the jet and in places that would be impossible to reach by any other method.

Further particulars regarding this pneumatic sprayer and cleaner can be had by corresponding with the above firm.

A TINLESS PHOSPHOR BRONZE BEARING METAL

Letters Patent have just been granted W. D. Berry, president of Berry Metal Company, New Brighton, Pa., for a tinless phosphor bronze bearing metal.

During the war, and while the Government was pleading for every one to conserve tin, Mr. Berry got busy and determined to do his bit. The outcome of his efforts resulted in the development and perfecting of a bearing metal alloy without the use of tin.

The Berry Metal Company are the sole manufacturers of this tinless phosphor bronze, and claim it to be the best bearing metal in the world. They are ready and willing to prove this broad assertion, by furnishing sample bearings to any one who is willing to give it a fair test.

Mr. Berry states, that tinless phosphor bronze bearings are now being used in some of the largest rod mills, band mills, and bar mills in the Pittsburgh district, and that all of these mills are getting better service than they ever got before.

The company is making a specialty of tinless phosphor bronze bearings for use in mills for rolling rods, bars, bands, hoop and merchant iron, also for locomotive and engine brasses, and it is their intention to establish agencies in each State, giving them the right to manufacture this metal. In addition to the above, they are also making phosphor copper and babbitt metal.

The Berry Metal Company was organized last June by Mr. Berry and his son, Walter V. Berry, who is secretary of the company. Plans are now being made for additional buildings, which will add 3,000 square feet to their present floor space.

NEW JERSEY ZINC COMPANY'S NEW BUILDING

With the completion of a unique seven-story building at No. 160 Front street, the sky line along the East River in lower New York City has become changed. Of additional importance is the fact that necessity demanded the completion of this building during the war period when only essential construction work was permitted.

Among the principal features brought out in the construction of this edifice was the quite general use of zinc materials. The design follows standards of modern architecture, but in the use of zinc for so many purposes, innovations are offered that are of interest to building contractors, manufacturers of builders' hardware, architects and realty concerns and other metal users.

It is certain that in few other buildings does this metal play so prominent a part. From basement to roof zinc material is embodied both on the exterior and for inside use. Zinc plated door checks, frames, window sash and locks are among the more apparent ways in which zinc is employed. By no means, however, do these represent the only utility of this metal, which has so rapidly come into prominence in so many new ways through conditions, in part, brought about by the war.

The building is being built by the Smith Valley Realty Company, for the exclusive use of The New Jersey Zinc Company. This concern, which has stood sponsor for many new uses of zinc in various forms, realized that for building purposes rolled zinc possessed many desirable features. Accordingly, plans were made, when the building was projected, to embody them in the structure. This was at a time well in advance of the ruling of the War Industries Board, which called upon manufacturers, as

a patriotic duty, to substitute the metal for others in the non-ferrous field for a great variety of uses.

Flashings, gutters and all other outside work are made of rolled zinc, this material having been substituted for copper, heretofore commonly used in construction work. In this not only does zinc perform the functions well, but it is also a material that entails less cost.

"The substitution of zinc for copper offers a new field whereby building costs can be decreased," said W. W. Ferguson, who is supervising construction. "The future should bring vastly increased use of this metal for the above purposes. It is easily worked, is non-corrosive and its durability has been thoroughly demonstrated in Europe where it has been employed for more than a century."

As one enters the building, a horse's head, the concern's trademark, carved over the doors, is passed under. The entrance and vestibule doors are found to be constructed of sheet zinc rolled on wood. The knobs and locks are made of zinc plate, a detail

that is embodied throughout. Zinc composition is the material embodied in the hinges.

Side walls of the elevators immediately inside are of zinc construction. Likewise, the elevator doors and bell plates are zinc coated giving a rich satin finish. All of the window hardware is manufactured from zinc plate. This includes sash, locks and handles.

A complete ventilating system is installed throughout the building. The grilles for the registers were first stamped and then zinc plated. These are found in suitable places, their locations being designed to produce the greatest possible efficiency.

Floors are of marble, while steel railings are found on almost every floor. Partitions are made of steel, and have a natural hardwood finish.

In the interior fixtures zinc materials are consistently employed. This metal is used in the hardware, including trimmings and fittings, of the mail chute. Some of the panel doors enclosing cut out boxes, enunciator boxes and all low tension work in the electrical equipment are made of zinc plate.

The lighting fixtures are also zinc plate, while frames for the illuminating lamps are spun from rolled zinc sheets. Ornaments that are to be found throughout the building have been cast from zinc.

Paint, enamels and tints that compose the interior decorations include zinc oxide and lithopone (zinc sulphide-barium sulphate) as ingredients. These are ordinarily used by paint manufacturers in the higher grade paints and enamels, however, and their use is, therefore, not considered as unusual in this structure.

Many of the furnishings to be used are designed to be in

keeping with the structural features of the edifice. These include desk fittings and office supplies, all of the materials for which are products of the tenant corporation. This applies even to the window shades which contain lithopone in their construction.

The company moves into the new quarters, which are at the corner of Maiden Lane, about January 20. The location faces some property which has been owned by the same interests, through having been handed down from one generation to another, since the Seventeenth Century.

WATERSTON TOOL-MARKING OUTFIT

J. M. Waterston, 77 Woodward avenue, Detroit, Mich., has recently placed on the market a convenient tool-marking outfit consisting of a steel scribe, a bottle of varnish, a bottle of etching fluid, a bottle of cleaning fluid, a brush and full directions for etching names or other desired marking on steel tools.



NEW JERSEY ZINC COMPANY'S NEW BUILDING AT 160 FRONT ST., NEW YORK.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

INSTITUTE OF METALS DIVISION

W. M. Corse, chairman, announces that the Institute of Metals Division of the American Institute of Mining Engineers had a very successful meeting in Milwaukee, Wis., last October. The papers were particularly good and the discussions very interesting. The attendance was well up to the usual number, and the session on the Symposium on the Conservation of Tin was very well attended.

The Committee on Precious and Base Metals is now to come under the head of the Institute of Metals Division. This will

AMERICAN ELECTRO-PLATERS' SOCIETY

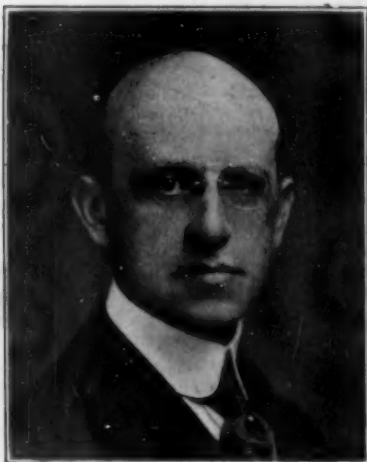
VICTORY BANQUET

New York Branch.—The banquet committee has issued the following announcement:

We take pleasure in extending to the manufacturer, superintendent, chemist and plater, a cordial invitation to attend the Tenth Annual Banquet of the New York Branch of the American Electro Platers Society, to be held at the Broadway Central Hotel, Saturday, February 22, 1919, at 7:30 p. m. sharp.

With the cessation of hostilities and the resumption of peace-

NEW VICE-CHAIRMEN OF THE INSTITUTE OF METALS DIVISION OF THE AMERICAN INSTITUTE OF MINING ENGINEERS



W. A. COWAN.



C. H. BIERBAUM.



W. F. FRANK.

increase the membership considerably and strengthen the personnel.

The winter meeting of the American Institute of Mining Engineers includes a meeting of the Institute of Metals Division at the New York headquarters of the society, 29 West 39th street, February 17 to 20.

The hotel headquarters for the Institute of Metals Division will be at the Hotel Seville, 29th street and Madison avenue. Members of the division are urged

to make hotel reservations promptly, and all of the members are particularly urged to stop at this hotel, so that the advantages of being together will be fully realized.

The following program has been arranged for the first day of the meeting, Monday, February 17.

9.00 a. m. to 9.00 p. m. Registration.

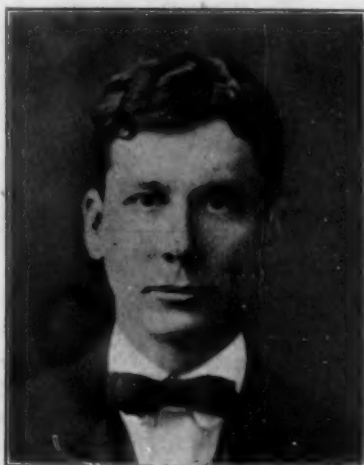
10.00 a. m. Simultaneous sessions of Institute of Metals Division and Industrial Organization.

12.30 p. m. Luncheon.

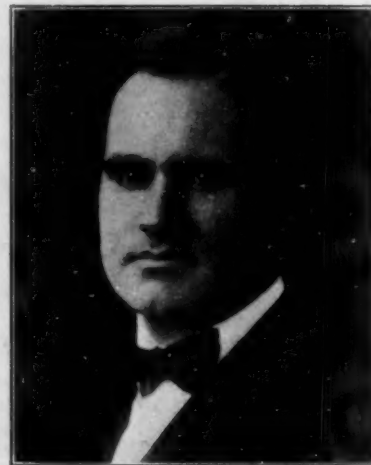
2.00 to 5.00 p. m. Simultaneous sessions of Institute of Metals Division and Industrial Organization.

3.00 p. m. Visit to Morgan Galleries.

8.30 p. m. Evening entertainment.



O. H. MATHEWSON.



ZAY JEFFRIES.

able industrial enterprises, we feel that there is no better time or place for the manufacturer to meet the foreman plater and become acquainted with the object and purpose of this society than at this banquet. We, therefore, ask your hearty co-operation in making this banquet a success.

This society is strictly an educational and scientific institution and is composed of foreman electro platers and chemists who are organized for the purpose of ad-

vancing their knowledge in the electro deposition of metals. It maintains research laboratories in various cities of the United States and Canada. And its members, by co-operation and the interchange of ideas and experiences, endeavor to increase the efficiency of the plants and departments under their management.

Our efforts have been crowned with success from the very first meeting of the few men who organized this society. It has been the means of improving production, doing away with guess work, and increasing the plater's knowledge and increasing both quantity and quality of production for the manufacturer.

In the past we have been allotting space to the supply houses to exhibit their products. But we have received so many requests for a booklet to contain the advertisements of the supply men that we have decided to act upon this suggestion. We have in preparation a booklet to contain the menu, advertisements of supply and chemical houses and also data of interest to the plater and chemist. This booklet to be distributed at the banquet.

As space for the booklet is going fast we advise our friends who desire space, which is \$5 per page, to notify our secretary, William Fisher, 300 St. Anns avenue, New York, as to the amount desired not later than January 15, 1919.

We invite the foreman plater to submit samples of his finishes for exhibition purposes. The samples can be sent to the American Electro Platers Society, care Broadway Central Hotel.

A committee will be at the hotel parlors all day, February 22, to welcome friends and members. The banquet committee is composed of William J. Schneider, William Voss, Thomas Hadow, William Fisher and John Sterling.

Philadelphia Branch.—Philip Uhl, secretary, 2432 North 29th street, Philadelphia, Pa.

The regular monthly meeting of this branch was held December 6 and quite a number of members attended. In order to facilitate the work for the convention to be held in Philadelphia next July, the branch has decided to hold an extra meeting each month, and will hold the first extra meeting the third Friday of February.

PERSONALS

ITEMS OF INDIVIDUAL INTEREST

DEATHS

LOUIS POTTHOFF

Louis Potthoff, president of the U. S. Electro-Galvanizing Company, Brooklyn, N. Y., died at his home in Montclair, N. J., on December 13, 1918. At the age of sixty-seven Mr.



LOUIS POTTHOFF.

Potthoff contracted the Spanish influenza early in the fall and a relapse from this attack confining him to his bed on Thanksgiving Day, he never recovered.

Mr. Potthoff reduced the process of electro-galvanizing to a commercial basis in the year 1894 and organized the National Galvanizing Company for the purpose of further development. He was a man of a great many original ideas and considerable inventive genius and this talent he devoted to the designing of various apparatus for automatically handling different kinds of material for electro-galvanizing and other

forms of electro-deposition of metals. Among his more important inventions are the following: Apparatus for electro-galvanizing small material which can be tumbled, apparatus for washing, draining and drying material after it has been galvanized; apparatus for electro-galvanizing elongated material such as pipe, rods, bars, etc.; apparatus for electro-galvanizing round or flat wire in continuous lengths; automatic conveyor tank for electro-galvanizing or plating material of varied descriptions; apparatus for automatically and continuously pickling, cleaning and finishing small articles.

In 1896 the National Galvanizing Company was re-organized and incorporated under the name of the U. S. Electro-Galvanizing Company, with Mr. Potthoff as the president, which position he held until the date of his death.

Mr. Potthoff was a man of abounding energy and continually exhibited an atmosphere of optimism. He was an untiring worker and up to the day of his death kept daily in touch with the affairs of his business. Mr. Potthoff leaves three sons, Erwin, Gerard and Kurt.

James Gustavus Gustafson, 32, who was to have been manager of one of the European plants of the Torrington Company, Torrington, Conn., died December 6, 1918.

E. L. STRAUSS

On November 11, 1918, E. L. Strauss, president of the Central Brass Manufacturing Company, Cleveland, Ohio, died at his home in Cleveland. Death occurred after a very brief illness and was caused by influenza contracted while on a business trip. Few of his Cleveland friends knew of his illness and word of his death was a very great shock to them as it will be to those of his friends and acquaintances in the trade.

Mr. Strauss was one of the younger men who have gained prominence in the brass manufacturing business. Only 37 years of age, he was a man of ripe experience in business affairs. He was a strong advocate of trade association. He was an active worker in every important movement for the benefit of the plumbing and allied interests, and at the time of his death was president of the National Association of Brass Manufacturers. His prominence in association affairs gave him many opportunities for war service, and during the years of war much of his time was spent at the capital city. These patriotic duties won him many friends.

Mr. Strauss began his business career at the age of 18 years when he took a shipping department position in the employ of the Central Brass Manufacturing Company, of which concern he later became president. By reason of hard and conscientious work he was soon given new duties in the general office. This new work provided the broader opportunities demanded by his aggressiveness, and it was the variety of duties in the general office that gave Mr. Strauss his thorough knowledge of business. In a very few years he became general manager of the company and in 1914 assumed the office of president.



E. L. STRAUSS.

Dudley Gregor Gautier, president Tacony Steel Company, Tacony, Pa., and vice-president of J. H. Gautier & Company, crucible makers, Jersey City, N. J., also head of D. G. Gautier & Company, 50 Church Street, New York, died at his home in New York, December 26, 1918, after a brief illness. He was 71 years old. Mr. Gautier had a home at 32 Fifth Avenue, New York, and also a country place at Hempstead, Long Island.

HOW WILL BUSINESS ADJUST ITSELF TO PEACE CONDITIONS?

A FEW OPINIONS GATHERED FROM PROMINENT METAL FIRMS

THE METAL INDUSTRY in order to throw some light on conditions in the metal trade recently addressed a letter of inquiry to a number of representative firms. The questions asked were as follows:

"1. Do you think the present prices for materials and labor will be maintained and for how long?"

"2. Will there be a decided slump in business conditions for the next two or three years or do you look for such an increasing demand for domestic consumption that there will be practically no gap to bridge over in passing from a war to a peace basis?"

The answers received are given below:

A. F. ROCKWELL, PRESIDENT BRISTOL NEWS COMPANY,
BRISTOL, CONN.

In my opinion the next few years will show the greatest industrial expansion that the country has ever known. During the readjustment period it is to be expected that every one will suffer including labor, but this condition will result, I believe, in bringing labor and capital in closer relationship to the benefit of both. During the war it was inevitable that some kinds of labor were paid in excess of its real worth and these artificial conditions can not be maintained, but expect efficiency to be increased to a point that will maintain very nearly the present average wage rate.

Increased efficiency is the key note.

JOSEPH SILLIMAN, PRESIDENT, MICHIGAN SMELTING & REFINING COMPANY, DETROIT, MICH.

You have given me a hard nut to crack, for I would hate to make any decisive statement as to what the metal business is going to do. We all know that the high prices for labor will have to be maintained for quite a while until the cost of living declines so a man can afford to work at a lower wage and live comfortably.

In regard to the price of metals, we are well aware that the producers of copper have been making a large profit and, of course, they are going to hang on as long as they possibly can—it is merely a question of how long they can get the price. There is one thing that is an actual fact and that is there is a large amount of waste material on the market which has accumulated since the stoppage of the war, and this material will have to be disposed of to the average consumer, and what the consumer is going to do is a question—whether he will start out and forget there was a war and proceed with his regular occupation and investments and keep business in good shape, is not known, although I hear many very optimistic views expressed. I am neither optimistic, nor yet pessimistic, but I really do not believe we will have good business until next Fall.

E. O. GOSS, VICE PRESIDENT AND GENERAL MANAGER SCOVILL MANUFACTURING COMPANY, WATERBURY, CONN.

My opinion has not been formed upon the questions that you ask. I can only express what I think should be the effort of all concerns, regardless of any individual interests, and that would be summed up in the expression that a stabilized market both for materials and labor is the thing most needed and most earnestly desired, and once that is attained it will be comparatively easy to make prediction as to the course of business.

FROM A LARGE METAL HOUSE.

Referring to letter asking for brief outline of the future outlook of the metal business, would frankly say that there is practically no business just now in our line. Everybody seems to be waiting to see which way the "cat is going to jump."

While most of our customers as we know, are not well

stocked on babbitts, solders, etc., everyone seems to be waiting for a decline in the price of metals and it rather looks as if the market price on all classes of soft metals will decline considerably.

With the knowledge that the Government have large supplies on hand which they are going to dribble out this will certainly not stiffen up prices for a considerable time.

We look, however, for a good resumption of business in the Spring and hope by that time that prices will have reached their level and legitimate demands will make a good normal business.

H. P. PARROCK, LUMEN BEARING COMPANY, BUFFALO, N. Y.

Material prices have already dropped sharply since the declaration of the armistice. The smelters have notified the miners that they will settle on the basis of 15c for copper. This action makes it appear doubtful that copper will sell over 18c during the first quarter of 1919. This procedure forces all of us, in this business, to a tremendous loss, since our copper has been carried, up to this time, at 26c per pound, and our cancellations have been very severe. I understand that the War and Navy Departments have issued instructions in regard to adjustment for such losses, but there is particular need of quick and intelligent interpretation by the field agents sent out to the various plants to carry out these instructions. It would appear better to accept the invoices offered by the various foundry managers, subject to refined adjustment later, when there is time for the Government officials to go over the records. What we need today, is an adjustment of the refunding for our losses, or many non-ferrous foundries will be put into an extremely critical condition.

While tin has been pegged at 72½c for definite grades and quantities held by those who imported this product during the war, there is an open market in which prices are considerably below this. Tin is selling below 70c per pound, and would sell much lower if only the demand were considered. There is an abundance of this material in the country, today.

All the other non-ferrous metals are down. We see no reason why a steady condition would be reached before March or April.

We do not believe, however, that the readjustment period will last, with us, much more than six months. We believe that by the fall of 1919 we should be on a firm peace basis, provided our losses have been taken care of by the Government. We refer, of course, to those losses arising from cancellations.

FROM A LARGE ROLLING MILL

"I am as usual a good, healthy optimist and believe that after the inevitable and proper and even desirable drop in the price of copper, which I hope will occur in the next fortnight, I believe we are going to begin on a period of continued strong business, calling for our products from both our mills and our cutting up shops.

"The war demands have resulted in leaving the country with stocks way below normal and I can not believe but that just as soon as people are reassured by a wholesome drop in the prices of raw materials and that things have reached a sound basis, business will pick up and we will have a number of years of healthy business conditions.

"I do not anticipate myself very large margins. Labor will resent lower wages, but in view of continuing them high it will of necessity and even willingly give increased and better production; so with raw materials and labor taken care of as above why should we not have real business and our facilities, even though somewhat excessive, be pretty well occupied. Naturally the night shifts will be dropped off and the nervous rush and overcrowding will be done away with to the satisfaction of all."

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

WATERBURY, CONN.

JANUARY 13, 1919.

Manufacturing plants of Waterbury and the Naugatuck Valley have not felt the sudden slump that some pessimists had predicted would come as soon as war orders were cancelled. Seven weeks have passed since the signing of the armistice that brought almost immediately cancellation of war contracts that had been placed by the Government, yet our streets are not filled with workers who are walking about looking for places and wondering how they can meet the bills of butchers, bakers and candlestick makers.

We are going through readjustment, but not by earthquake shocks that are bringing industry tumbling about our ears. The general tone of industry hereabouts is healthy and the optimism keen. Manufacturers are confident that six months will find wheels whirling, but unable to do all that the world will be demanding that they do.

The Berbecker & Rowland Company, manufacturers of furniture trimmings and brass specialties, did not get war orders under way until other plants hereabouts had gotten into full swing on such work. They clung to their normal lines later, in fact were handling such lines all through the war, though they did take on many war orders later. The result was uncomfortable for the concern during that period when it began to get very difficult to get raw materials for anything but that which the Government had marked "war rush." There was a slump because of lack of materials and the plants that were going full tilt in war work began to take the Berbecker & Rowland workers away.

With the coming of peace, however, the Berbecker & Rowland concern had the advantage. It was holding more of its normal peace-time work and it had no need of many changes. The result was that it stood ready to take back employees.

The Waterbury Clock Company was in the same situation as the Berbecker & Rowland Company. The Clock Company did practically no war work, so that, under Government restrictions, it was pretty well depleted of workers. The result was that the Clock Company met the ending of the war with an immediate call for more workers. It put a display advertisement in local newspapers noting its need for 300 men and 300 girls for general factory work, 25 automatic machine men, 25 tool makers and 15 tool setters. An index of the situation is given in the fact that the advertisements ran for a week or 10 days before the needs were met. The company got its workers because there has been the shifting that might naturally be expected in the move from war to peace work.

The Bristol Brass Company, Bristol, Conn., has been carrying standing advertisements in local papers for workers. It also has long felt the need of employees and has had work that it could quickly swing to in peace orders. The Oakville Company, which makes pins and novelties, has been taking in employees during the past few weeks as has also the American Pin Company, a concern that gave many of its workers to the war plants.

The Novelty Manufacturing Company, along with other brass goods plants, has been getting some peace orders and many "feelers" that appear to come from a market that is uncertain as to what should be a fair price, and consequently wants to get quotations from many concerns before making a decision.

The week of December 15, brought a convention of the selling force of the Scovill Manufacturing Company to the city. The large plant has done such a big business in manufacturing goods under contract for distributors that it has never built up a large selling force such as might ordinarily be looked for in a plant of that size. Its selling force numbers 20, but it is expected that it will be increased. The plant was not waiting for the ending of war to prepare for peace trade. This force had been busy organizing for the work that it is now entering upon for over a year. Not only the home market, but the foreign market, especially the South American market, has been given careful attention, and it is expected that the great plant that has been expanded by the war will be kept busy at producing the thousand and one things that it can so readily turn itself to for peace

consumption. There was vim and enthusiastic confidence in the salesmen who gathered here, and if vigor counts for anything they should be turning big business shortly.

Salesmen of brass plants who have been coming back from the road report here that the depleted condition of the market everywhere cannot fail to turn the vigorous business in a comparatively short time. One who was talked with yesterday stated that it is his conviction that the building business, when once it gets under way, will precipitate a rain of orders that it will be difficult to keep up with. Plumbing shops are as empty as though the Kaiser had been requisitioning all their metal supplies for army use. They cannot begin to supply the building business until they have bought goods that means the consumption of brass, nickel, iron, lead and practically all metals. The same is true of hardware and all the metal that goes into building. The building business, many brass salesmen are convinced, will lead the way for all other lines.

With this in view these men are much pleased at the fact that the winter is so mild. That means the probability of an early spring, which will mean that building activities can take an early start this year.

From the point of view of this city the outlook is good. There are no pessimistic manufacturers here. And their forecast of good business is not founded on sentimental hopes. They apply sound Yankee sense to the condition of a market that must soon demand metal goods in large quantities.—E. R. S.

BRIDGEPORT, CONN.

JANUARY 13, 1919.

The work on war contracts among the factories in this city is being gradually cut down and the number of discharged is constantly increasing. So far, it has meant the discharge of about 8,000 machinists, but a great many of that number secured employment elsewhere, and many left the city where work was to be had. It is not easy to estimate the number of idle men in the city at the present time because of the constant shifting, but with the continuous increase of returning soldiers the number of idle is naturally growing all the time.

The work at the Remington Arms plant and the Union Metallic Cartridge Company is 100 per cent war work, and what they do in the matter of discharging is in the hands of the Bridgeport ordnance district. The cutting out of some of the war orders resulted in the dismissal of the entire night shift at the Union Metallic Cartridge Company and some of the day force. The estimated releases December 20 was 1,200, but at the labor headquarters it is said that the number is larger than that.

One of the rumors in labor circles today is that the Remington Arms plant will follow in the same policy and will discharge all its night shift within a few days, which, if true, will mean about 5,000 more added to the discharges. An attempt was made to get an authoritative statement from the office of the plant on that rumor but without success.

The dozen or more small contract shops are practically idle, they having lost their sub-contracts from the larger plants.

The labor leaders in the city are endeavoring to offset, in a way, the force of sudden cancellation of war orders, and propose to bring about a scheme that the men work less hours every day so that the work will be spread out longer.

Waldo C. Bryant, chief of the Bridgeport ordnance district, says that the prevailing impression that war contracts are to cease here by January 31 is erroneous. He stated that he had no such information from Washington, nor had he any information that the contracts are to be all completed at that time.

A notice has been posted at the Liberty ordnance plant that money due some 2,000 for back pay and overtime was paid out to those who were entitled to it at the employment office Monday and Tuesday, Dec. 23 and 24.

In the matter of conducting election for department committees in some of the shops in the city, especially where women are employed, permission has been given by Examiner Alpheus Winter that women conduct the elections under the sanction of the National War Labor Board.

L. M. P.

TORRINGTON, CONN.

JANUARY 13, 1919.

Torrington manufacturers as a whole are exceedingly optimistic over the prospects for 1919. Prior to the armistice, every energy and every resource of practically every plant in town was devoted to turning out products essential to the winning of the war, but with the cessation of hostilities the transition from a war basis to a peace basis was begun immediately and the indications are that it will be completed without necessitating any great layoff of men nor suspension of operations. In a few instances, of course, it has been necessary to close down certain departments. In several of the plants, particularly those manufacturing machines, automobile parts, etc., the making of so-called war products had entailed no changes aside from those necessary to increase the output because of the greater demand. The equipment and organization remained the same.

War products of every description were shipped from Torrington by millions of pounds; but while these were in the making, orders for non-essentials were accumulating and when the war contracts were cancelled most of the plants had enough of these back orders on hand to enable them to start manufacturing non-essential products without delay.

With the cessation of hostilities another big problem faced the manufacturers—the employment of returning soldiers. So far as the local shops are concerned, the men who entered national service will be given their old jobs as far as possible. Many have already returned and resumed their work.

The superintendent of one of the largest plants in town informed a representative of THE METAL INDUSTRY that all apprentices who return will be given the wage rate which they would have attained had they not entered the service. Apprentices who would have become journeymen if they had not entered service will be given journeymen's pay although they will not receive their certificates until they have served the required period of time. Work will also be given to maimed employes wherever possible.

The following announcement was made to manufacturers here by the local office of the federal employment service:

"To enable the employment service to find other employment for munitions and other civilian war workers as they are released by curtailment of war orders it is necessary to appeal to sub-contractors on war work and all peace work employers to immediately notify the United States employment service of their wants, possible and actual, for all sorts and kinds of labor; also, for their office needs as there will be, in all probability, many skilled workmen, clerks and women workers who will apply to the employment service for positions.

"It is particularly necessary that the employment service be advised of all openings for workers, and all non-war manufacturers who in their present and future operations will need labor are requested to get in touch with the service. Only through having advance information of the easing off of all industrial operations can the employment service adequately devote its facilities towards re-location of war workers.

"Extensive transfers made recently which might well be considered the most dangerous period give promise that the service can handle the situation provided that all employers whether large or small keep the service informed and it is their patriotic duty to do so."

That conditions throughout the State are causing more or less worry is indicated by the following telegram sent to the district chief of ordnance by the State Manufacturers' Association:

"The manufacturers' Association of Connecticut urges that you present to the chief of ordnance the facts already brought to your attention concerning the serious effects upon conditions in Connecticut of the recent and impending cancellations and suspensions of war contracts. This association, on the basis of returns from its own investigations, is already in position to affirm positively that the number of workers now being deprived of employment is many thousands larger than can be absorbed in other industrial establishments. We recognize that the national interest requires cessation of production of war material at the earliest possible moment, but we are equally convinced that the national as well as

State interests will be seriously prejudiced by precipitating unemployment upon thousands of loyal workers, particularly at the moment when they are just recovering from the serious consequences of the influenza epidemic and facing the problems of winter. We are more than satisfied that you should base your representations on the statements communicated to Washington by Governor Holcomb and the United States Employment Service. Our own reports establish conclusively that the manufacturers of this State are exercising their best energies in getting their establishments on a peace basis and putting their men into permanent employment as rapidly as possible."

Questionnaires were sent to every manufacturer who is a member of the association asking the following questions:

How many men have you laid off as the result of the cancellation of war contracts?

How many men will you be compelled to discharge if all war contracts are suspended by January 31?

The replies received were responsible for the sending of the foregoing telegram.

The Torrington Company has purchased the W. L. Platt property which adjoins the company's property on Main street. The deal involved about \$20,000.—J. H. T.

NEW BRITAIN, CONN.

JANUARY 13, 1919.

Demobilization plans of the American army are not expected to play a very important part in New Britain's manufacturing reconstruction period, except as the cancellation of certain Government contracts may cause a cessation of certain branches of work. All of the factories will make an effort to replace their employees who left to enter the army or navy, and Landers, Frary & Clark, in a statement sent to all former employees in the service, has pledged itself to give them work, saying: "We wish to confirm the general understanding between us when war was declared, that a place is ready and a welcome awaits you on your return." The Stanley Works has gone even further and has made an exhaustive study of its plant to ascertain just how many incapacitated soldiers can be accommodated at the factory.

In changing from a war to a peace basis the local factories will encounter but very little difficulty. With the exception of the New Britain Machine Company, none of the concerns were compelled to erect any new buildings or install any quantities of new and expensive machinery to handle war orders. The Machine Company erected two large buildings and these will probably be used for some purpose, although just what for has not been determined. All night work has been stopped at the plant and as a result the working force has been reduced. A number of the big machines have also been taken down, cleaned and made ready for sale.

One of the first cancellations received was by the Corbin Screw Corporation, where a bayonet nut order was cancelled. This was a sub-contract from Landers, Frary & Clark. Speaking for the entire American Hardware Corporation, President H. C. M. Thomson states that while some orders have been cancelled, the concern is not yet affected seriously. Large cancellations are likely to come, but when, is a matter of conjecture.

The North & Judd Manufacturing Company has not been seriously affected as yet, and the Traut & Hine Manufacturing Company likewise continues at work on Government contracts. Gun slings are still being made in large quantities here, and as soon as the war work is ended the factory is prepared to begin at once on a domestic line of goods. Included in this line are several new novelties that will be entirely new on the market and for which a big future is predicted.

In reviewing the work of New Britain's manufacturing concerns during the months that America was in the war, much could be said. Practically every factory, big or small, did its share. The New Britain Machine Company probably did the most work on heavy ordnance, for it was here that big anti-aircraft gun mounts were made and the whole weapon assembled. Machine-gun tripods were also made here, as well as shell caps. This concern worked night and day for many months in turning out Government products. Next in line comes Landers, Frary & Clark. Night and day shifts were employed in turning out all kinds of army equipment, from mess kits to death-dealing

bayonets and trench knives. Both the North & Judd Manufacturing Company and Traut & Hine made millions and millions of snaps, fasts, buttons and other army accoutrement, and the American Hardware Corporation turned out millions of deadly hand grenades. Gas masks were also made at the local factories and smaller sub-contracts for springs, chucks and other articles essential to the vast war machine and machinery were made here.—H. R. J.

PROVIDENCE, R. I.

JANUARY 13, 1919.

The year 1918 has passed into history, although it will be a long time before its industrial history will be successfully written.

Its close witnesses the termination of a period of prosperity and activity never before experienced, the existence of long world war on foreign soil creating an abnormal demand upon the resources of the United States in men, money, food, fuel, manufactures, in fact almost everything, that resulted in a scarcity of labor, inflated wages, high prices and curtailed privileges.

The new year finds a complete reversal in the labor situation that is one of the chief topics of interest to the manufacturers of all lines in Rhode Island. Only a few weeks ago there was the same great demand for labor that has prevailed during more than four years. At the present time there is more labor than there is demand for. With many of the mills and factories cutting down on their production because of cancellation, operatives have been thrown out of work. This is particularly true of all concerns that were engaged on Government contracts, either directly or indirectly. The plants engaged in the making of munitions have already made big cuts in the number of workers employed and this has thrown many out of work.

This change in the labor situation is, nevertheless, causing employers no end of worry. A short time ago the Government employment bureaus were kept busy finding men and women to satisfy the wants of the manufacturers engaged in essential industries. At the present time these Government officials are equally busy, but now they are trying to find jobs for hundreds of men and women who have been forced out of work because of the attempts at retrenchment by the manufacturers.

Many of the mill men have announced that they are awaiting the return of the men in service before they fill the vacancies in their factories, and when any great number of the soldiers have returned the Federal employment bureau officials will have a busy time.

The new year witnesses the inauguration of one of the most important changes in industrial circles that has occurred in this city and vicinity in many years—the adopting of an eight-hour day by the manufacturing jewelers. At a special meeting of the New England Manufacturing Jewelers' and Silversmiths' Association on Friday, December 27, it was voted to recommend to the manufacturers of this city and the Attleboros the adoption of a 48 hour week to become effective on or before April 1. This will affect more than 300 establishments—large and small, and more than 15,000 employees.

Manufacturers of jewelry, that is, many if not all, will keep their promises to men who joined the colors. This will hold good no matter what condition in general business besets the industry. Patriotism of jewelry workers is to be recognized to the limit, whether business be good or bad, but so far as the jewelry business as a whole is concerned bad business is not anticipated.

With the second class of workers, those who left their positions and sought employment in other localities and in other trades, comes what might be termed secondary consideration. In these cases no promises of holding open positions were made. If the men want to return to their former places the question of supply and demand in the jewelry markets will become operative.

There is no reason, according to men who follow the jewelry business closely, to expect any slump in the demand for jewelry. Rather, they look for a general continuation of exceptionally good business. It has been good for several months and financial conditions in certain portions of the country at the present time assure jewelers a continuance of trade. Everything points to a healthy trade for a number of months of the current year, consequently there will be demand for jewelry labor. Under

the revised work day schedule, certain manufacturers are of the opinion that jewelry labor can be assimilated more easily, and opportunities offered larger numbers of operatives.

The Providence Manufacturing & Tool Company is making extensive alterations to its one-story brick manufacturing building on Warren street, this city.

The Diamond Machine Company, 9 Coddington street, has given notice to the Secretary of State's office that it has reduced its capital stock from \$20,000 to \$2,000.

The U. S. Manufacturing Jewelry Company, 19 Calender street, is being conducted by Minas Mesrobian, Kachig Israyelian and Leon Minasian, and the N. & S. White Manufacturing Jewelers, 25 Calender street, by Harry Natanian and S. A. Minasian, according to their statements filed at the city clerk's office.

A number of the concerns identified with the metal trades paid their employees generous Christmas gifts of cash, also bonuses. Among the firms were the City Brass Foundry Company, Pawtucket, and Irons & Russell Company.—W. H. M.

ROCHESTER, N. Y.

JANUARY 13, 1919.

With the advent of the new year business conditions among Rochester's many manufacturing industries is unusually bright. From every hand manufacturers freely declare that the year of 1919 will prove to be better than is now anticipated. Not only have orders come in without hesitation or the understanding that after-war agreements must be taken into consideration, but there is a general demand to "go ahead" and at once.

With such a general feeling of prosperity on all sides, every big plant in Rochester is planning on doing a tremendous business this year. Every concern is prepared to take on its former employees, meaning, of course, the returning soldier and sailor boys from France or from camp. The Eastman Company announced early last fall that every man that had gone to the front from its employ would find his job open on his return. The same splendid spirit of patriotism and appreciation prevails in every manufacturing industry in Rochester.

Rochester manufacturers have been planning since October for the change from a war to a peace basis, and the scheme is now in full operation. Not an institution in the city has laid off a man or woman, except the purely munition plants. Many of them, like the Eastman Kodak Company and the Bausch & Lomb Optical Works, have taken on more hands and will continue to do so. Rochester is now the greatest center for the manufacture of optical goods in the world.

Shipping facilities, both in and out of the city, are constantly improving. This fact is a source of unconcealed joy to all manufacturers. Added improvement is anticipated from now on until things become normal once more.

The local market for copper is very quiet, while the bottom has completely fallen out of the scrap copper market for all kinds. The metal is readily obtainable and deliveries are good.

Brass is still on a decline. Little or no red brass is required in the Rochester market.

The spelter market is stationary, although the demand is good. Despite the heavy demand for lead, the price of the metal has declined of late. Aluminum shows little change. The demand is strong and supplies are readily obtainable since the Government embargo was raised. Practically all stocks here are received from Niagara Falls and Massena, N. Y.—G. B. E.

ROME, N. Y.

JANUARY 13, 1919.

The year just closed was one of the busiest in the history of the metal industries of this city, being profitable to both mill-owners and mill-workers. All through the four years of war there has existed in Rome a mutual interest on the part of employer and employees, characterized by a pulling together by both so that the material necessary to make the world safe for democracy might be supplied quickly and in enormous quantities. Through this spirit of co-operation, a constant flow of vast shipments of metal-industry supplies went forth from this city throughout the period of the war.

While the industries here have taken part in large war orders

they have not so changed their plants and business methods that they cannot again slip into ordinary peace-time business with comparatively little delay. And because of this fact the belief prevails here that this city, in so far as its metal industries are concerned, will not experience a period of business depression, such as might occur in communities where munition properties were hastily built for a temporary business.

The metal manufacturers of this city have formed themselves into an organization known as the Rome Manufacturers Association and an incorporation charter has recently been issued by the Secretary of State. The object of the association, as stated in the by-laws, is to promote the co-operation of all manufacturers in all matters pertaining to the betterment of manufacturing, working and living conditions in Rome and to collect and disseminate information of value to its members; to promote a helpful spirit among the manufacturers and to offer aid to any new manufacturing plant that may be established in Rome.

The officers of the new association are: H. T. Dyett (Rome Wire Company), president; E. L. Spriggs (Rome Manufacturing Company), vice-president; C. H. Halstead (Rome Textile Company), treasurer. The officers and the following prominent manufacturers constitute the board of directors: A. F. Carpenter (Rome Metallic Bedstead Company), Frank J. DeBisschop (Rome Hollow Wire & Tube Company), Barton Hazelton (Rome Brass & Copper Company), George W. Turney (Rome Turney Radiator Company).

With reference to the association, President Dyett gave out a statement in which he said the factories of Rome had done their "bit" in war business, having turned out vast quantities of materials needed by the government, and will now turn to the manufacturing of products needed in all parts of the world. The local factories, he said, believe in encouraging the young men of Rome to consider the advantages open to them in all of the growing industries here. "The manufacturers of Rome desire to continue to promote the friendliest relations between labor and factory management, as no town can prosper in a large degree without that harmony which grows out of fair, broad-gauge methods," Mr. Dyett declared.

Frank J. DeBisschop, president and general manager of the Rome Hollow Wire & Tube Company, and widely known in metal industry circles, will pilot the affairs of the Rome Chamber of Commerce during the year 1919, having been elected to the presidency of that organization. Mr. DeBisschop is a native of Bayonne, N. J., being born there in 1879. In addition to being an able executive he is a highly efficient factory man. His first employment was with the Waterbury Clock Company of Waterbury, Conn., as a department foreman, and his second connection was with the Holmes, Booth & Hayden Company, also of Waterbury. After two years with the latter firm he accepted a position with the Benedict & Burnham Manufacturing Company, Waterbury, with which company he remained seven years. He came to this city in 1905 as superintendent of the Rome Tube Company, a branch of the Rome Brass & Copper Company, but only remained here one year at that time, going to Hastings-on-the-Hudson as superintendent of the seamless tube mill of the National Conduit & Cable Company. However, at the end of a year with the Hudson River concern he returned to this city as superintendent of the Rome Metal Company, also a branch of the Rome Brass & Copper Company. After a stay of two and a half years with the metal company, in January, 1910, he secured an interest in the Slade Tube Company of this city and became president and general manager. In the following July the name of the company was changed to the Rome Hollow Wire & Tube Company, and Mr. DeBisschop was elected president and general manager of the new company, which position he holds at the present time.

Besides being connected with the Rome Hollow Wire & Tube Company, Mr. DeBisschop is secretary of the Kent Vacuum Cleaner Company and a director in the Hughes Manufacturing Company, both of this city, and a trustee of the Rome Trust Company. He has been identified with the local Chamber of Commerce since its organization and has done much toward bringing it up to its high standard of usefulness. He has the confidence of the manufacturers and business men of the city and will, without doubt, make a splendid record in the office to which he has just been chosen.

M. J. D.

COLUMBUS, OHIO

JANUARY 13, 1919.

The metal market in Columbus and central Ohio territory is unsettled to a large degree. Owing to uncertainty on copper prices there are no fixed quotations on any metals and the business is being conducted from a hand-to-mouth basis. Owing to the stoppage of hostilities many large orders for metals, especially copper, spelter and aluminum, have been canceled. Reserve stocks in the hands of metal-using concerns are generally sufficient for the present and very few have approached a peace basis as yet.

On the whole, trade conditions are very much unsettled, and dealers as well as consumers are at a loss to proceed. The main point is the uncertainty in the copper market and the questions surrounding the price of 23 cents. The strongest point in the local market is the demand for type metals, which is strong. Brass and copper are not nearly as active as was the case several months ago. There is not a great deal of demand for aluminum. All prices are affected more or less by the uncertainty in copper.

Metal concerns in Columbus were patriotic to the extreme and all co-operated actively towards winning the world war. They followed governmental restrictions patriotically and also purchased Liberty Bonds and Thrift Stamps in large numbers.

Metal-using concerns are now laying off men, and it is doubtful if they can absorb many of the returning soldiers under present conditions. But the managements announce that all returning soldiers will be given preference in their old jobs and some few have been placed.

Milton Loeb, son of Henry Loeb, of the Ohio Metal Company, who was a lieutenant in the aviation service, has been discharged from the army and is now on the road for that concern.

The Akron Brass Company, of Akron, Ohio, has been chartered, with a capital of \$50,000, by W. H. Dillon, G. R. Pettijohn, G. L. Crum, L. S. Selle, and W. V. Smith.

The Metal Smelting Company, of Cleveland, has been incorporated, with a capital of \$10,000, to deal in various metals. The incorporators are S. I. Powell, I. Grohs, P. M. Kuederle, Morris Siegel and F. M. Wheeldin.

The Aluminum Castings Company, of Cleveland, has awarded a contract for the erection of three more units to its plant. The structures will be of brick, steel and concrete construction and will cost in the neighborhood of \$500,000. When completed the plant will consist of eleven buildings.

The authorized capital of Trumbull Bronze Company, of Warren, Ohio, has been increased from \$10,000 to \$50,000.—J. W. L.

CLEVELAND, OHIO

JANUARY 13, 1919.

The turn of the year finds the metal industry, which may be considered as the backbone of all industry in Cleveland, prepared, or preparing, to return to peace time production. The period of transition, however, is extending out longer than was anticipated before the war ended. This is due to two reasons—belief that prices on materials are to be lower, and that labor costs will be lower. In a few instances in copper, brass and the like, the first belief has been realized. The second has not yet come to pass, but present indications are that this is not far off, as many plants related to the metal industry, which have been working exclusively on war-time production, and therefore have had to employ a superabundance of labor, are laying off workers, and it is but natural that a reaction in labor cost soon must follow. So far there has been little re-employment of returning soldiers to their former jobs, for the simple reason that there have been fewer soldiers returning to Cleveland, up to the present, than elsewhere. It is significant, however, that where the high class men of pre-war times are returning, their jobs are waiting for them, whether these jobs are in executive capacity or in the working field itself.

By far the greatest significance to the metal industry here is the statement of former Ohio Senator Theodore E. Burton, now president of the Merchants' National Bank, before the Chamber of Commerce of this city. Mr. Burton predicts that prices on materials and living are certain to

drop, and that wages will drop with them, although perhaps not as low as the prices on materials and necessities. Mr. Burton points out that prices move in cycles of alternately high and low points, and that now is the time for them to go down, with the making of peace.

Questioned regarding the basis for his predictions, Mr. Burton said: "War always stimulates the industry of victor and vanquished alike. Therefore I doubt whether the great expectations of vast trade with the allies is going to be realized here. Therefore also I do not view with the same confidence that others seem to have the opening up of peace markets of Europe. Rehabilitation will be slow on account of the lack of credit and those nations' desire to produce the articles necessary for restoration will cut down America's share in the rebuilding of Europe."

Regarding the predicted fall in prices and wages, Mr. Burton stated that this drop will be gradual and general, but perhaps sudden and sharp in spots. He predicts the high cost of living will disappear in its worst aspects, but that there can be no return to the levels of 1890 and thereabouts, as there has been too much gold placed in circulation, causing a permanent inflation.

Greater co-operation between employers and employees is also predicted by Mr. Burton. "There shall be a greater regard for each other," he said, "as every one must recognize the other as a part of the community. Men high in ranks of labor insist that wages shall stay up. This is impossible. Employers are asking that prices stay up. This too is impossible."

Members of the metal industry in The Flats, the great section in the Cuyahoga Valley that has made Cleveland possible, have joined the Cuyahoga Valley Business Men's Association in an effort to safeguard the interests of the entire district. About 50 per cent of the entire metal industry is located in The Flats. The movement is the outcome of the plan of large financial interests to erect a mammoth passenger and freight railroad terminal fronting on Public Square and backing into the flats a great distance. West Third street, the principal thoroughfare leading to and from the Flats, will be closed by this plan. The valley industries want a good means substituted for this closing of this street, otherwise a long detour around the north hill of the Flats will be necessary. The league also seeks to have the present Scranton Road Car line preserved, even if necessary to reroute it, and the establishment of an additional car line, as well as the straightening of the river for a distance of a mile and a half.—C. C. C.

CINCINNATI, OHIO

JANUARY 13, 1919.

With 1918 behind and a new year opening up, the various members of the metal trades and allied industries in Cincinnati can look back with considerable satisfaction upon their accomplishments during the past year, and, at the same time, with some degree of confidence toward the future. Especially in view of the successful termination of the war can Cincinnati members of the trade review the history of the past year, inasmuch as they contributed in no small degree to the splendid response of industry to the needs of the Allied cause. The part which the machine-tool trade, in particular, played in enabling both this country and the Allied nations across the Atlantic to meet the enormous requirements of the fighting forces has been tremendous, and it is only stating the simple truth to say that Cincinnati concerns were more prominent in this respect than those of any other city in the country.

The cessation of hostilities, of course, put an end to the tremendous demands for machinery for making shells, guns and other war materials; and the uncertainty which at the same time descended upon business in general brought about a general lull in the machinery trade, which, emphasized somewhat by cancellations, is still in evidence. Efforts to foresee the future are naturally being made, and leading members of the trade, looking ahead into 1919, declare that they see no ground for pessimism, although at the same time they admit the probability of some months of quiet in the

trade. They point out that it is impossible to look for the same extraordinary demand for equipment in peace times, even under boom conditions, as under the stress of war's requirements for supplies, and that, on the other hand, a factor to be considered is that hundreds of factories with war orders have increased their capacity, both in machinery and buildings, to a point where further equipment will not be needed for some time to come.

The axiom of the trade, that machinery and supply trades are the last to feel stimulus and the first to feel depression, has also been frequently quoted of late, and the reasons suggested above are referred to in support of the suggestion. On the other hand, however, it is stated that the extent to which orders from concerns not affected by the war have been postponed means that there is a really considerable volume of business which has only been waiting for peace to be taken care of. When this makes itself evident, as it is expected to do in the near future, the machinery manufacturers look for a marked change from the present dullness. It is also worth noting, as of interest to the metal trades, that the makers of plumbing supplies and of building hardware and similar material are looking for a great increase in building work, inasmuch as the restrictions imposed by the Government upon the building industry during the war have now been removed, and with better financial conditions and freedom to go ahead, numerous jobs which were postponed can now be handled. The labor problem, which for a year or so, at least, has troubled the manufacturers with the phase represented by scarcity of workers, is now faced with a decided change of front. Instead of a shortage, there is now a surplus of workers. Not only are the large forces needed during the war rush now unnecessary, but returning soldiers, many of whom formerly worked in the machinery plants, furnish an additional problem. Speaking generally, it may be said that numerous unskilled workers taken into the machinery plants during the war emergency, especially women, will probably be discharged, in order to cut the forces down to a basis more in accordance with conditions. This movement, in fact, is already under way. On the other hand, it is the general intention of the manufacturers, evidenced by action already taken, to take back into their employment men who went into the Army, even though they may not be actually needed. Room will be made for them, as a rule, in recognition of their services to the country, as well as on account of the general appreciation of the fact that it is desirable to absorb the returning men as rapidly as possible.—K. C. C.

DETROIT, MICH.

JANUARY 13, 1919.

Detroit is facing the same problems as other cities, so far as finding employment for returning soldiers is concerned. Practically all the great manufacturing establishments, especially those engaged in the manufacture of automobiles and automobile parts, made up more or less of copper, brass and aluminum, already have mapped out a program that will take care of every Detroit soldier, whether he went overseas or remained in the American camps. Thus far every soldier has been given a job, although most of the plants are only getting ready for the heavy production they plan for within the next few months.

One of the greatest problems, however, is taking care of the wounded. One of the first to take up this problem is Henry Ford, of the Ford Motor Company. Within the last two weeks Mr. Ford has announced he is prepared to give employment to 4,000 wounded soldiers. He even announces he can use blind men for counting screws and bolts. In fact he already has a number of such men in his employ, some having been with him for several years. One of the features about this proposition is that wounded and blind men thus employed will be given the regular five-dollar-a-day-wage after they have been employed for 6 months. While there are few Detroit employers who are ready to employ blind men and men without legs or arms, it is a fact that practically no honorably discharged Detroit soldier need to suffer here for want of work. It might be well to add at this time that Detroit is only just about able to care for its own soldiers. The Board of Commerce has a published announcement advising

all labor to remain away from Detroit until the spring campaign starts. Then Detroit will demand labor as it never has before.

The great building campaign mapped out for Detroit, and in fact practically all the great industrial centers throughout the country, means a great revival in the manufacture of plumbers' supplies and builders' hardware. Many of these plants in Detroit have subsisted largely on war contracts and automobile work. It is believed now they will come into their own again and the next year or so seems very bright in this field here.

The manufacturing jewelers also seem to hope for an extension of business. It has been quite good here for the last several months. This is due to the fact that more people have bought jewelry because they have had more money to spend. Munition workers in Detroit have been among the jewelers' very best customers.

Taking everything into consideration, Detroit's future never was more favorable. Practically all the automobile companies, together with the brass, copper and aluminum concerns, have experienced a very profitable year. Most of these concerns were engaged heavily on war contracts right up to the last minute. Now all are hustling to get in shape to resume normal activities. In a few months it is believed the old order of things will be under way.—F. J. H.

MILWAUKEE, WIS.

JANUARY 13, 1919.

Milwaukee metal trades manufacturers are facing the new year with extreme confidence. Practically all are hopeful of continued prosperity despite the fact that, with the ending of the war, army or navy contracts, running into the millions, have been canceled.

There are, however, a large number of firms still busily engaged in completing contracts for the Emergency Fleet Corporation and these contracts promise to keep the plants busy well toward the end of the winter and may possibly run until spring.

While the reconstruction period is on in Milwaukee like elsewhere, it is remarkable to note that comparatively few men have been affected by the labor situation. This is taken to mean in some quarters that the manufacturers are well stocked up with peace-time orders, and, it is asserted, many of the firms, seeing the war's end near, have gradually turned their attention to peace-time pursuits.

As yet it is a little premature to state just what metal manufacturers in Milwaukee have accomplished toward winning the war, as they have not finished checking up on war orders. But a conservative estimate places Milwaukee's war production well over the \$50,000,000 mark for the metal branch alone.

The watchword here now is to keep as close to war-time production, wages and hours as possible and cause as little trouble as can be helped during the reconstruction period. There is the same feeling prevalent here that when the soldiers and sailors come back in trainloads, there will be a mad scramble for jobs and which will not be obtainable. Manufacturers take a different view of the situation.

In the first place, there will be but 50,000 of the boys coming back within about eight months. This is their estimate. They say what are 50,000 men throughout the whole state of Wisconsin. "It is just a drop in the bucket," one manufacturer put it, "and will not cause one iota of unemployment."

Practically all firms have stated that they will take all of their men, who have been in military service, back into their employ. The Allis-Chalmers Company, the Briggs-Stratton Company, the Power Mining Company, Nordberg Manufacturing Company, A. O. Smith Company, and the Evinrude Motor Company are ready to employ the men just as soon as they return. If the men cannot be placed in their old jobs, they will be given work suitable to them.

Every effort will be made to obtain positions for crippled soldiers; for these, above all, must be taken care of, it is stated.—B. E. S.

LOUISVILLE, KY.

JANUARY 13, 1919.

Although there is no unusual commercial demand being experienced in the copper-working trades of Louisville, the general

metal industry is managing to keep fairly busy. Every brass, copper and plating shop in Louisville reports all the business it can handle, and orders on hand that will keep them going for six months at least. Most of this business is for the Government, as although the Government has canceled many contracts in some lines, they are going right ahead with deliveries of tube contracts, and orders that were placed in connection with ship-building.

Hines & Ritchey is finding things a little dull in the copper shop, which has been handling commercial business, but its milk-machinery business is going fine, there being a big demand from the South, which is prosperous and where much improving is under way. The company now has milk-machinery orders on hand that will keep it going until about May 1, and enough business will be developed in the meantime to keep the plant going for several months past that period.

Matt Corcoran, Jr., of Matt Corcoran & Company, stated that the concern had received no cancellations on its war orders for ship work, and was working time and capacity in getting out special tubes, etc. Mr. Corcoran believes that war work on hand will keep the plant busy for the greater part of the coming year, unless unexpected cancellations develop. As a result of peace he expects to be able to secure a larger and better crew at the local shops.

Practically the same story is found at the plants of Ahlers & Gregoire and the Vendome Copper & Brass Works, two plants which have been busy on war orders for several months past. Although the Government has decided to cancel a number of ship orders, a great many vessels are well along and will be completed.

With the Independent Brass Works business is rushing. This company reports that it has enough war work on hand to keep it going for several months, and that it is considerably behind on some standing commercial orders. One standing order keeps one of its best molders busy all the time, and J. W. Rademaker, manager of the company, can see no reason why 1919 should not prove a great year.

Louis Rindt, as president of the American Brass & Plating Works, has filed a notice of dissolution for the company, action having been taken on December 1.

Theodore Mueller, manager of the Standard Sanitary Manufacturing Company, recently announced that the company would pay about \$40,000 over to its employees this year in the form of a bonus on work done during 1918.

To date the Louisville metal workers have made no announcements relative to plans for taking care of returning soldiers, or those injured in the war. This work is being left to the Manufacturers' & Shippers' Association, and a number of business organizations, which are endeavoring to secure a list of all industries in the state, and which industries can use men that are partially disabled. The general tendency is toward giving the American fighting man a chance wherever possible. At the present time there is a good demand for skilled workers, as most of the shops have been short of really efficient men. Women are slowly going out of general manufacturing lines and are being replaced by men. Wages are high and showing very little tendency toward a decline, while manufacturers as a rule are endeavoring to secure more efficient and willing workers, rather than cut wages. During the latter part of the war a great deal of very poor grade labor was used, but this is steadily being replaced with better men as they return from service or are released by concerns which are short of business.—O. V. N. S.

TRENTON, N. J.

JANUARY 13, 1919.

Although the armistice was signed some time ago, the Trenton metal industries still continue to work on some Government orders, and are awaiting word from Washington to cancel further operations on the same. Practically all the Trenton metal plants are or have been turning out Government work. The concern working on the largest contracts for Uncle Sam is the John A. Roebling's Sons Company, where copper cables and other products made from copper are manufactured. The De Laval Steam Turbine Company is also another large producer for the Government. Besides making turbines the company is busy on various other kinds of work. The turbine company re-

cently leased the entire plant of the Howard Demountable Rim Company in Hamilton Township, in order to take care of the tremendous increase in business. The De Laval Company has removed its entire pattern shop to the Howard plant. The Skillman Hardware Manufacturing Company, Trenton Brass and Machine Company, Billingham Brass and Machine Company and other concerns are turning out Government work. The Jordan L. Mott Company is completing a big Government order for ammunition and does not expect that the order will now be canceled.

The Skillman Hardware Manufacturing Company has had a few orders canceled by the Government, but is still working on some. The company is now taking an inventory of stock, and after the first of the year will start its salesmen on the road to book orders.

Previous to the ending of the war, the Westinghouse Lamp Company had difficulty in keeping every department in operation because of the scarcity of female help. Now that some of the other plants are beginning to lay off help, the Westinghouse company is having all the old positions filled.

The metal manufacturers have announced their intention of reinstating all their former employees who have been called into the military or naval service and who have received an honorable discharge. The Municipal-State-Federal Employment in the city hall will have charge of the work of relocating the men who were called to the colors.

The Ingersoll-Trenton Watch Company, Jonathan Bartley Crucible Company, McFarland Foundry and Machine Company, Mercer Automobile Company, Jordan L. Mott Company, John A.

Roebbling's Sons Company, Trenton Brass and Machine Company, Westinghouse Lamp Company, and the Billingham Brass and Machine Company have notified the employment bureau that they are ready to take back the old hands. Some of the concerns have also announced that mechanical aid will be given the employees who were crippled in battles, so that they may become self-supporting. Many of the employees quit the plants where war work was not being turned out to seek employment in essential plants. The new and unskilled hands in the metal plants will therefore lose their positions when the experienced hands return. In cases where work cannot be found at the present time for the returning soldiers the matter will be taken up by the employment bureau so as to place them in other positions temporarily.

Factory Supplies and Hardware Company, of Newark, N. J., has been incorporated with \$50,000 capital stock to manufacture and deal in various kinds of hardware, plumbing supplies, etc. The incorporators are R. A. Nesbit, F. X. Bauer and J. M. Cooney, all of Newark.

The Union Smelting Company, Newark, N. J., erected a one-story brick shop, 24 by 25 feet, to its plant on St. Charles Place. The structure cost \$4,500.

L. H. Wood & Company, Inc., incorporated at the State House, Trenton, N. J., with \$10,000 capital, to manufacture and deal in various kinds of jewelry. The incorporators are M. Wood, Felix A. Wiener and Elizabeth C. Knauer, all of Newark.

The Essex Foundry Company, Newark, N. J., will build a brick office and garage, two stories, 12 x 180 feet, to cost \$35,000.—C. A. L.

VERIFIED NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

An extension to be used for tumbling barrels and core ovens is being erected to the foundry of the Pratt & Whitney Company, 436 Capitol avenue, Hartford, Conn.

The Wisconsin Aluminum Foundry Company, Manitowoc, Wis., by B. Dallwig, secretary and treasurer, announces that the published report that they were planning to build a foundry is incorrect.

The S. A. Day Manufacturing Company, 1483 Niagara Street, Buffalo, N. Y., manufacturer of buffing wheels and other platers' supplies has increased its capital stock from \$10,000 to \$25,000.

The Michigan Smelting and Refining Company, 1685 Joseph Campau avenue, Detroit, Mich., will build a one-story steel cupola building, also a foundry building, heating and die casting plant, warehouse and forging shop.

The Empire Machine Works, Terre Haute, Ind., by W. K. Moore, president, announces that they are going to add a brass foundry to the present equipment at once and will be in need of furnaces, core ovens, shanks, tongs, flasks, molding machines, etc.

The Hoffman Bronze and Aluminum Castings Company, 1000 Addison Road, Cleveland, Ohio, is erecting an addition, 21 x 105 feet, to its foundry at an estimated cost of \$8,000. The company operates a brass, bronze and aluminum foundry, grinding room and casting shop.

William C. Cabell, of Passaic, N. J., representing a syndicate of New York men, purchased 2,500 shares of the capital stock of the Bronze Powder Works, Elizabeth, N. J., at an auction sale conducted at the plant recently by representatives of the A. Mitchell Palmer, enemy alien property custodian, for \$217,500. His bid of \$87 a share was the highest offered by the three principal bidders.

The Tallman Brass and Metal, Limited, Hamilton, Canada, has awarded the contract for the erection of a one-story addition to its plant at an estimated cost of \$1,000. The company operates a bronze, brass and aluminum foundry, brass machine shop, tool and grinding room, casting shop, spinning, stamping, tinning, soldering, brazing, polishing, plating, japanning and lacquering departments.

The McKenna Brass and Manufacturing Company, Inc., First avenue and Ross street, Pittsburgh, Pa., is resuming operations at its plant on a pre-war basis and is said to have orders on hand to provide for full operations for some time to come. The company operates a brass, bronze and aluminum foundry, brass machine shop and plating, polishing and lacquering departments.

The U. T. Hungerford Brass and Copper Company, New York, has added to its large site by the purchase of 81 White street. The property consists of a five story building, 25x100, fifty feet east of the seventeen story Hallenbeck-Hungerford building, which covers the Lafayette street frontage, from Franklin to White street. The company now owns 81 to 95 White street, a plot fronting 182.2 feet.

The R. B. Lang Manufacturing Company, Racine, Wis., manufacturer of hardware specialties, novelties, sheet metal stampings, and nickel plating, sustained an estimated loss of \$25,000 by fire in its plant on December 7. The loss was entirely covered by insurance. The main shop was considerably damaged. Reconstruction has already been started. The departments operated by this company are: tool room, stamping, plating, polishing, japanning and lacquering departments.

Watson, Frye & Company, 19 Broad street, Bath, Me., manufacturers of bronze castings, is planning to rebuild its plant which was destroyed by fire at a loss of \$75,000 last spring, and expects to have the plant in actual operation by June 1. The company has just been incorporated, with a capital stock of \$200,000, by Scott R. Frye, president and treasurer; Orrin F. Frye, manager, and Ralph O. Dale. The departments operated are a brass, bronze and aluminum foundry, brass machine shop, tool and grinding room, casting shop and polishing department.

The W. G. Hawes Foundry Equipment Company, New York, N. Y., is building an addition to its plant on Steuben street, near Park avenue, Brooklyn, N. Y. The building will be 50 x 100 feet and will cost \$7,500 and will be used as a machine shop for fabricating brass globe valves and steam specialties. The company is also contemplating the erection of a larger foundry on adjoining property. Among the various departments operated by this company are a brass, bronze and aluminum foundry, brass machine shop, tool and grinding rooms, brazing, soldering, polishing and lacquering departments.

Owing to the upheaval in the business conditions among users of tin due to the sudden termination of the war, it has been decided by the United Smelting and Aluminum Company, New Haven, Conn., to continue the tin conservation contest which was to have closed December 1, 1918, until March 1, 1919. It will be recalled that this contest offers cash prizes of \$100, \$50 and \$25 for the best letters concerning the conservation of tin. A number of letters have already been received and the company would very much like to see the number of competitors increased.

The Merchant & Evans Company, Philadelphia, Pa., with smelting plants in Philadelphia, Pa., and Chicago, Ill., annually produce a very heavy tonnage of all grades of solder, babbitt and type or newspaper metals and during the past forty years have furnished large quantities of these goods to the United States Government and in every instance to fully meet the specifications. The most exacting requirements were always met with promptness and strict adherence to formula. All standard grades are carried regularly in stock at warehouses and plants and special alloys quickly furnished.

Announcement has been made of the formation of the British Metals Corporation, capitalized at approximately \$25,000,000, of which \$9,000,000 has already been subscribed. The corporation will provide machinery for carrying on a form of control over the metal industry within the British Empire. Prior to the war the German metal combine (Metallgesellschaft) was represented in Great Britain by Henry Merton & Company. This firm has been refused a license under the nonferrous metals act, and it is understood will go into liquidation. A good description of the operations of the firm of Mertons is given in the article appearing on another page in this issue of THE METAL INDUSTRY.

The General Briquetting Company, 25 Broad Street, New York, is installing its new demonstration and custom briquetting plant at 57th Street and 12th Avenue, New York City.

This plant is designed to demonstrate on a commercial scale modern methods of briquetting metal, coal, flue dust, concentrates and other fine materials. The installation includes a "Type A" 325 ton hydraulic metal briquetting press adaptable to brass, aluminum or other metal scrap; Belgian roll coal briquetting machinery; rotary toggle press, masticators, annealing ovens, dryers, elevator and conveyor system and power plant. It will commence operations about February 1, 1919, and the cost of the installation was \$200,000. H. K. Schoch, chemist, late of the Bureau of Standards, Washington, D. C., and George R. Cowan, briquetting engineer, late of Ellington Field, Texas, have resumed their positions with the General Briquetting Company.

LABELING OF GOLD-FILLED FINGER RINGS STANDARDIZED

For the better protection of the purchasing public and on agreement with manufacturers, the Federal Trade Commission has induced all the principal makers of gold-filled, gold-plated and gold-shell finger rings to adopt standard labeling indicating exactly the proportion of gold used in every ring offered the public. The standard label is as follows:

"The words 'gold shell' preceded by the designation of the alloy of gold used in the shell, which shall be preceded by a fraction designating the correct proportion of the weight, of the shell to the weight of the entire ring: illustrated by '1-10 14-k gold shell,' in which case 1-10 of the entire ring by weight is 14-k gold and constitutes the outer shell."

"The stipulation does not oblige the manufacturers to stamp the rings, but applies only in case they are stamped, and the taking effect of the stipulation is set for May 1, 1919."

CHANGE IN FIRM NAME

The name of the Brown Specialty Machinery Company has been changed to the Rich Foundry Equipment Company. The original company, incorporated in 1901, was purchased by Elmer

A. Rich, Jr., in 1912. As the company's exclusive product is foundry equipment the new name is adopted on account of being more descriptive than the old one. No change in the policies of the company is contemplated.

DIVIDEND

Extra dividends aggregating \$5.50 a share were ordered paid at a meeting held December 18 by directors of the Phelps-Dodge Corporation, New York, on the capital stock. Added to the regular dividend of \$2.50 per share, this makes a total disbursement of \$8. The extra dividends are payable \$3.50 in cash and \$2 a share from reserve for depletion in 4¼ per cent. Liberty bonds.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To manufacture brass, bronze and aluminum castings.—The Reading Brass Works, Reading, Pa. Capital, \$10,000. Arthur R. Wicklein, treasurer.

To manufacture metal articles and castings.—The American Art Metal Works, Newark, N. J. Capital \$50,000. Incorporators: Felix P. Holemar, R. C. Duerr and Roy J. Harding. The company is interested in wood turning machinery, sand blasts or other machinery for finishing metal goods, and operates a tool room, cutting-up shop, plating, polishing, japanning and lacquering departments.

The Royal Manufacturing & Foundry Company, Oshkosh, Wis., has been incorporated, with a capital stock of \$30,000, to take over and develop the business of the Schloemer Manufacturing Company, also of Oshkosh. The company operates a brass, bronze and aluminum foundry, brass machine shop, tool room, stamping, brazing, plating, polishing and lacquering departments. The officers of the new company are: Frank Clark, president; R. P. Hainsworth, vice-president and general manager, and P. J. Schloemer, secretary and treasurer.

FOREIGN TRADE OPPORTUNITIES

For addresses of these inquiries apply to Bureau of Foreign and Domestic Commerce, Washington, D. C., and give file numbers.

27909.—A firm in Italy desires to secure an exclusive agency for the sale of brass and iron tubes (black and zinc coated) and fittings, tin sheet, metalworking tools and small machine tools, and electrical supplies and equipment. Terms, 30 to 90 days' credit, or cash in 30 days with 2 per cent discount. Correspondence should be in Italian. References.

PRINTED MATTER

Blow Torch.—The S. Obermayer Company, 2835 Smallman street, Pittsburgh, Pa., has issued a bulletin describing the C. M. blow torch which it is stated throws a hot flame four feet long and which is said to be the most effective blow torch made.

Carriers and Containers.—The Rogers Fibre Company, New York, furnish a complete line of Leatheroid factory carriers and containers. All of these products are illustrated and described in a booklet just issued by the company and further information and prices will be quoted upon request.

Calendars for 1919.—Among the metal firms issuing handsome and indispensable calendars for 1919 are the following:—E. A. Williams and Sons, brass founders, Jersey City, N. J.; General Electric Company, manufacturers of electrical

machinery, Schenectady, N. Y., and the Youngstown Sheet and Tube Company, manufacturers of tubes and sheet metal, Youngstown, Ohio.

Material Conveyors—The Green Engineering Company, East Chicago, Ind., give complete information, including descriptions and photographs of the Green materials transfer and storage hopper in a recently issued catalog. This is stated to consist of new equipment which is well adapted to the storage of foundry sand, coke and cleaning room dust and so forth. Copies of the catalog may be had upon request.

Air Brush—G. J. Nikolas & Company, Chicago, Ill., publishes a very interesting description of the Nikolas air brush in a little folder just issued. The No. 3 spraying outfit shown in the illustration in the folder comprises an air compressor, unloader, lathe, air brush and air receiver, and it is stated that with this outfit a large saving can be effected in labor costs in finishing metals by spraying. Air brushes and exhaust fans are also illustrated and described in the folder.

Ingot Metals—The Ajax Metal Company, Philadelphia, Pa., has issued an interesting little booklet of thirty-six pages which they call "A Text Book on Ajax Ingots," being a companion edition to "A Text Book on Babbitt Metals." This little book contains information as to how to select an alloy to answer a certain purpose and gives suggestions for proper use of the Ajax ingot metals and concludes with a complete list of the products manufactured by this company.

Ventilation—The Detroit Steel Products Company, Detroit, Mich., has issued a little pamphlet "Building Daylight and Ventilation into Modern Foundries Increases Production." The pamphlet is concerned with illustrations and descriptions of the Fenestra solid windows which are used to solve the ventilation problems in foundries all over the country. A number of very interesting photographs showing installations of various types are included in the publication.

"Hilo" Paste Woodfillers—Bulletin No. 4, issued by the Hilo Varnish Corporation, 1 Gerry street, Brooklyn, N. Y., contains samples of Hilo Paste Woodfillers applied to the actual wood in various finishes. These fillers are suitable for all open-grained woods. The same filler will produce different effects on different woods, such as oak, ash, chestnut. Still other variations in effect are obtained when a coating of white shellac or varnish is added. Metal manufacturers whose products consist partly of wood can secure full information from the Hilo Varnish Corporation at the address given above.

Brazing Compound—A new brazing compound, which has been given the name "Fluxine," is described in a folder prepared by Krembs & Company, Chemical Laboratories, Chicago, Ill. There are shown some very convincing photo-

graphs depicting the results said to be obtained by the use of this material. It is stated that Fluxine is the most powerful spelter absorber known and, having such an affinity for brass, insures an even flow of spelter in the joint to be brazed, resulting in a perfectly secure joint. The manufacturers state that they would be pleased to answer any inquiries.

Safe Practices—The National Safety Council, 208 South La Salle street, Chicago, Ill., has issued bulletins Nos. 16, 17 and 18. These bulletins are devoted respectively to "Safe Clothing for Men and Women in Industry," giving description and photographs of the proper kind of working garments for workers of both sexes; "Yards," with instructions and illustrations for safe and economical layouts for plants, grading and drainage, road and walk ways, and entrance and exit gates; "Power Presses," which contains descriptions and illustrations of numerous safety devices which are applicable and should be used on all types of presses used in the metal industries.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL STOCKS MARKET QUOTATIONS

NEW YORK, January 13, 1919.

	Par.	Bid.	Asked.
Aluminum Company of America.....	\$100	\$500	\$600
American Brass	100	213	218
American Hardware Corp.....	100	133	138
Bristol Brass	25	28	32
Canadian Car & Foundry, com.....	100	27	30
Canadian Car & Foundry, pfd.....	100	82	85
Eagle Lock	25	82	85
International Silver, com.....	100	20	—
International Silver, pfd.....	100	82	87
New Jersey Zinc.....	100	255	260
Rome Brass & Copper.....	100	300	350
Scovill Manufacturing	100	340	370
Standard Screw, com.....	100	—	270
Standard Screw, "A" pfd.....	100	103	—
Yale & Towne Mfg. Co.....	100	210	225

Corrected by J. K. Rice, Jr., & Co., 36 Wall street, New York.

METAL MARKET REVIEW OF 1918—OUTLOOK FOR 1919

WRITTEN FOR THE METAL INDUSTRY BY W. T. PARTRIDGE.

JANUARY 13, 1919.

The growth of international commerce in all lines during the past year, according to authoritative banking estimates reached a valuation of probably 50 billion dollars, eclipsing all previous records and establishing the United States in the world's markets as the great creditor nation.

In merchandise alone, the extent and value of our world-wide trade is revealed in the favorable trade balance as indicated by the valuation of our exports and imports. In 1917, when all previous records were broken, the trade balance in favor of this country was \$3,278,777,021; exports being \$6,231,244,976 and imports, \$2,952,467,955. In the year just ended—including reliable estimates for December, full official figures being unavailable as yet—the valuation of exports amounts in round numbers to \$6,100,000,000, imports being \$3,100,000,000, indicating a trade balance of \$3,100,000,000 and closely approximating that of last year—final figures may even carry to another new maximum, is the opinion expressed by many.

In considering the future outlook, a study of the figures of the year's exports and imports is of value as an indication of probable requirements at home and abroad since it is the consensus of opinion as expressed in trade that our peace time needs will be equal to if not in excess of the war's demand. Imports for eleven months this year made a new high record, \$2,821,326,193, as compared with \$2,724,556,448 for the corresponding 1917 period, the largest gain being in November, the total gain over the 1917 period being \$95,769,710. Exports, on the other hand, were at ebb tide in November, amounting to only \$552,000,000, while the total for the eleven months period was \$5,585,000,000, as compared with \$5,633,000,000 in the corresponding period in 1917.

The valuation of metals produced in the United States in 1917 amounted to \$2,092,000,000, being 42 per cent. of the total valuation of all mineral production, showing an increase of 29 per cent. over the value of metals produced in 1916, or \$471,316,000. The total metal valuation was \$1,620,508,000 in 1916. The total

increase, however, was 90 per cent. due to blast furnace products, the remaining percentage being due to the advances made in valuations of aluminum, copper, lead and silver. The valuations of gold and of zinc recorded decreases. Official figures showing 1918 production of metals will not become available for some time but it is believed that they will closely approximate those of 1917, any difference, however, being in favor of a higher valuation rather than a lower one.

Transportation problems during the first two months of 1918 loomed large, harassing business, and for a time at least, Government control of the railroads seemed to increase difficulties, among which the advanced freight rates were prominent, adding to already mounting costs. Labor troubles were continuous in that higher wages were in frequent demand with constantly depleted man-power because of the draft, which took away experienced men whose places had to be filled by less efficient workers. Government regulation and control of distribution and of selling prices was also a factor, limiting transactions to necessary war requirements in many instances, and prohibiting profits which were cheerfully relinquished in order to win the war—the one vital necessity of the world in 1918.

Fully 90 per cent. of the entire copper production in this country was absorbed by our Government and its allies in filling war requirements at a fixed price alike to all—23.50c. per pound at first, and later advanced to 26c. Entire output of aluminum was under strict control at 33c. per pound maximum base. All supplies of platinum were requisitioned at \$105 per ounce while silver was in such demand that Government restriction of exports became necessary and a world price of \$1.01 $\frac{1}{4}$ c. per fine ounce was established. Forty per cent. of quicksilver production was acquired by the Government at \$105 per flask of 75 pounds each. Lead requirements were enormous, the producers establishing a fixed price of 7.75c. per pound, East St. Louis basis, working in harmony with the War Industries Board. Prime Western spelter and antimony were the only metals that were allowed to follow the natural adjustment to supply and demand in regard to prices, neither of these metals being required in sufficient amounts to make control necessary. Old metals followed prices indicated by the major market metals. In the tin market a complicated and unique situation was developed that greatly restricted business throughout the year, fixed prices impending for eighteen months but not announced until almost a month after the war was over.

Following the virtual ending of the war in November, the necessity for Government control of markets, passed. The War Industries Board—with the exception of the Price Fixing Committee—established for this purpose, ceased to function on January 1, 1919, after having transferred any unfinished business on hand to the War Trade Board. The Price Fixing Committee, however, continues to exist until such time as all time limits on fixed prices naturally expire but no extensions in time limits will be made and no new prices will be established by it.

The outlook for 1919 is most encouraging, for generally speaking, stocks of material held by consumers are low and when trade confidence has been restored by price reductions to the level that indicates a sufficient profit in new business undertaken, a rapidly increasing demand will be experienced. In the meantime, caution is exercised and only necessary purchases made to fulfill urgent requirements.

COPPER.

All things considered, the copper industry probably fared better than almost any other metal industry during 1918. Active control by the Government was established in September, 1917, when the price was fixed by agreement with copper producers at 23.50c. per pound to all consumers alike, under regulations that promised to maintain maximum production and not to reduce wages. Thus, early in the war, the industry, knowing exactly what was required of it became adjusted to war conditions and acquitted itself creditably and satisfactorily to all concerned. Other metals, less fortunate in regard to early action by the Government, were more or less hampered and restricted in operations by the uncertainty as to just what form of regulations and prices might be adopted in each case.

Freight congestion, fuel shortage, railroad embargoes and unfavorable weather combined during the first two months of 1918 in not only interfering with production at mines, smelters and refineries but were also responsible for constantly rising costs. Later, when higher wage scales for labor, which was becoming

less and less efficient, became necessary because of increasing competition with contractors engaged upon war work, productive costs reached a point making it necessary for high cost small producers to unite in an application to the War Industries Board for a higher selling price to enable them to continue production without actual loss. Small consideration was given to the plea of the smaller high cost producers, who pointed out that refiners' charges had increased their costs. On May 22, the 23.50c. per pound price was continued, to be effective to August 15.

In June, the 25 per cent. freight advance rate became effective and it was soon discovered that in practical application of the schedule regulations, transportation charges were in some instances increased as much as 75 per cent. instead of 25 per cent. This, of course, further increased cost of production and the large producers now united in vigorous protest to the Government presenting a strong case with adequate reasons for an advance in selling price. They also pointed out in making their plea, that the price had been entered into by agreement between themselves and the Government and that its continuation to June 1 had also been by agreement, but, that the arbitrary extension to August 15, made by the War Industries Board, had never been accepted by the producers; furthermore, there was no law to compel producers to accept findings of the board, otherwise than by agreement. On July 2, the trade received announcement from the War Industries Board that beginning immediately the price of copper would be 26c. per pound, effective until August 15.

Some confusion resulted among consumers, particularly among brass manufacturers and wire drawers, who had taken contracts for munitions based upon 23.50c. per pound for their copper requirements but these contracts, after prolonged delay in negotiations, were satisfactorily adjusted. On August 7, it was announced that by agreement with producers, the 26c. per pound price was extended to November 1. During August and September labor difficulties became a source of growing concern and uneasiness to producers, manufacturers and also to the Government. Inefficiency at brass mills had resulted in greatly reduced output of brass sheets used in making shells and various war munitions, but prompt action by the Government in procuring labor in sufficient numbers relieved the situation.

When in October, the political collapse of Turkey, Austria and Bulgaria occurred, it became evident that the downfall of Germany and the ending of the war must soon follow, but no slackening of effort occurred in the copper industry and on the 26th of the month the price was again continued by agreement at 26c. until January 1, 1919. With the signing of the armistice on November 11, the industry immediately gave its attention to vigorous measures for readjustment to a peace time basis. November 15, at a conference in Washington between producers and the War Industries Board, it was determined that no revision in price or change in regulations would be made before January 1; developments in the interim being allowed to indicate the best course to be pursued in regard to any continuance of Government control. Interest was at once centered in the formation of an American combination of producing and selling interests in order to meet the organization abroad of buying syndicates, representing foreign consumers of copper.

These efforts culminated in December in the incorporation of the Copper Export Association, Inc., organized for co-operative effort on the part of producers to handle and to control export trade in distribution of orders and selling prices. Later in the month, came the announcement that the War Industries Board would cease to function January 1, 1919, and that the 26c. price of copper and the regulations agreed to, in establishing it would cease to exist on that date by natural limitation. Assurances were given that the Government stocks known to be very large, would be released in such a way as not to disturb the market. During the last week, the Export Association announced its readiness to sell at 23c. per pound delivered f. o. b. New York for export orders and although no buying had been announced December 31, it was understood that negotiations with foreign buyers were in progress. On December 31 sales of electrolytic by second hands were made at 21.50c. per pound, casting copper at 19c. per pound.

Production of crude copper in the United States in 1918 is estimated to have been at least 1,910,000,000 pounds by domestic smelters. Refined copper derived from foreign material approxi-

mated a yield of 570,000,000 pounds and if current output from domestic smelters was all refined production of refined copper was 2,460,000,000 pounds. If recoveries in secondary copper equaled 1917 output, then total output from all sources amounted to 2,500,000,000 pounds establishing a new maximum in the industry.

Exports in 1918, estimating December outgo—for which figures are not yet available—were 312,000 tons indicating a 37 per cent. decrease in tonnage from the 1917 outgo. Imports of copper, on the other hand, were record-breaking. Estimating November and December, for which official figures are not yet announced, total arrivals were approximately 253,000 tons.

TIN.

The tin market in 1918 was more seriously restricted than that of any other metal. Belated Government control was so delayed in its action that transactions in Straits metal were practically impossible throughout the year. This was due in the beginning to British regulations which withheld permits and all statistical information. Negotiations between representatives of the United States Government and Great Britain were in progress many months, the trade in the meantime being in suspense and almost at a standstill. The result of negotiations was the formation of the International Allied Tin Executive, made up of representative members of the different governments, and which was authorized to control and to allocate world production of tin at regulated prices through its appointed representatives. In this country, the United States Steel Products Company was appointed sole importers of the metal with the privilege of buying 60 per cent. of the world's output to be sold under license to consumers here, at cost of importation. Other regular importers under this ruling were unable to do business and formed an association making protest to the Government. Before the fixed price, 72.50c. per pound was announced December 4, the armistice had been signed placing the trade in a peculiarly complicated position which made business impossible except in resale lots by consumers who were quickly released from British regulations which previously had prohibited such sales. These offerings were sold at prices ranging downward from 71.50c. for pure tin to 69c. for 99 per cent. tin at the close of the year.

Fluctuations in spot prices during 1918 carried upward from 86c. the new maximum established in 1917 and which exceeded by 21c. per pound the highest price ever before paid, to another new high record, when \$1.10 per pound was paid on May 10—an advance of 24c. per pound beyond the 1917 maximum. This price was paid for inferior grades, not for Straits metal. Notwithstanding reports of acute shortage of tin throughout the greater portion of the year, giving rise to belief that consumption of tin had greatly increased; this proved to be a false assumption, when heavy accumulation of stocks in the hands of consumers became known, and which could not be resold under early British restrictions.

Reductions of Bolivian ore to fine tin in this country were larger than ever before, 8,793 tons being reported by the New York Metal Exchange for ten months, but these figures are not complete and are sure to be higher when final returns are known. Arrivals during eleven months at Atlantic and Pacific ports were 53,972 tons, as compared with twelve months arrivals in 1917 of 54,867 tons. December figures are not complete but with 105 tons known to have been received at Atlantic ports and 2,620 tons reported from the Pacific coast, total figures for 1918 are certain to exceed those of 1917 by more than 2,000 tons.

SPELTER.

With the market handicapped by over-production, transportation difficulties and uncertainty as to Government action in regard to prices, transactions in prime Western spelter were naturally restricted early in the year. Prices were at the lowest point, 6.62½c. per pound in April. Long expected Government buying developed in May but the quantity bought was a disappointment. Later, with foreign buying and some orders from consumers here, the market was strengthened and prices advanced reaching the highest of the year in October, 9.85c. East St. Louis basis. Demand falling off, prices again declined, but, when after the signing of the armistice, galvanizing interests appeared in the market as buyers, there was a recovery, the outlook for 1919 business being optimistic. At the end of the year in the absence of demand, prices were down to 7.70c. per pound, East St. Louis,

8.05c. New York. Zinc ores were weak, second grades being held at \$35@42.50 per ton.

Exports during eleven months were 15,122 tons derived from foreign ores and 57,287 tons from domestic ores, as compared with 57,042 tons derived from foreign ores and 135,245 tons from domestic ores in 1917.

LEAD.

During first six months 1918, business was in fair volume at steadily advancing prices from 6.43¾c. East St. Louis at the beginning of the year. Thereafter, with constantly increasing Government requirements that became enormous, creating acute shortage of supplies, danger of a runaway market was threatened. This, however, was prevented by the voluntary formation of the Lead Producers Committee, which working in close harmony with the War Industries Board established prices at 7.75c. per pound East St. Louis, 8.05c. New York, as agreed upon maximum prices for lead. After the signing of the armistice and the release of huge supplies held for Government requirements, the American Smelting & Refining Company in three different reductions amounting in all to 2c. per pound, established the "Trust" price at 5.75c. per pound in an effort to readjust business to a peace basis by the end of the year. In the outside market the decline was to 5.70c. East St. Louis, 5.75c. New York. Lead ore dropped from \$100 per ton to \$60 per ton during the month.

Exports of lead during first ten months 1918 were 26,176 tons derived from foreign material and 51,573 tons from domestic material, as compared with 29,886 tons from foreign material and 50,211 tons from domestic material during the entire period of 1917.

SILVER.

The demand for silver in 1918, owing to war requirements for coin and the maintenance of trade values in commerce was enormous and resulted in an agreement between the governments of the United States and its Allies upon the fixing of a price to rule the world's markets, at 101½c. per fine ounce, the New York official quotation being 101½c. At the beginning of 1918 the New York market was 86½c., which by August had advanced to the controlled price fixed at 101½c. in the New York market. No change had occurred at the end of the year. Restrictions imposed against industrial uses of silver made necessary by the war were promptly removed November 16 after the signing of the armistice.

Our yearly production is \$70,000,000, while world production amounts to 159,000,000 ounces or to \$156,000,000 in money valuation this year. Actual demand in 1918 exceeded 500,000,000 ounces. Importations for eleven months 1918 were \$67,000,000, indicating a decrease of \$20,000,000 from 1917 importations.

Exports, on the other hand were enormous, being \$205,000,000 during first eleven months, as compared with \$54,000,000 in same period 1917—an increase amounting to \$151,000,000.

QUICKSILVER.

Government requirements of quicksilver absorbed 40 per cent. of our entire production in 1918, estimated 36,000 flasks, 75 pounds each. A falling off in output estimated at 5 per cent. of usual production excited grave fears of a shortage, but the sudden ending of hostilities relieved it. While the Government paid \$105 per flask for pure, and \$100 for recoveries, to other consumers, the price was at the highest point in January, \$125 per flask. Gradually this price was reduced from month to month until at the end of December, \$115 was the quotation. Demand was very light in anticipation of a further decline of \$12 to \$17 per flask before bottom prices are reached. The Government accepted the full amount of metal contracted for at \$105 per flask, including the December quota.

Production in 1917 increased 12 per cent. over that of 1916 but output this year, figures not being yet available, is known to have decreased, probably 5 per cent. at least. Importations which in 1917 were 5,000 flasks, it is believed, will show a large increase when official figures become available.

PLATINUM.

Demand for platinum during the past year exceeded that of any previous corresponding period. This was due to its largely extended use in filling various war requirements never before met. Acute shortage early in the year made it necessary for the Government not only to commandeer all supplies of stock but to solicit from the general public, donations of articles and jewelry

containing the metal. Strict regulations placed a ban upon any non-essential use of the metal and established the price to be paid by the Government at \$105 per troy ounce, this having been the quotation in the market since March, 1917. Promptly after the signing of the armistice the ban upon any other than wartime essential use was lifted and Government control ended. While late in December there were rumors of sales made at an advance in price, quotations continued to be made at \$105 when the year ended. The outlook is for continued heavy demand as new uses in airplane motors and other ways will not be cut off by the ending of the war.

Annual production in this country estimated at about 1,000 ounces—as a by-product mainly from placer mining in California and Oregon—it is expected will show an increase when 1918 total figures become available. Refined production in 1917 was 33,000 ounces of platinum, 210 ounces of iridium of which 7,400 ounces platinum originated from domestic material. Savings from scrap resulted in 72,000 ounces in 1917, this being 24,000 ounces more than 1916 recoveries. Importations of crude metal amounted to 52,721 ounces, including the 21,000 ounces received from Russia late in December, 1917.

ANTIMONY.

The year opened with expectation of very heavy Government buying for shrapnel and for which large accumulations of metal had been imported. The expected demand, however, did not develop during the year. Other buying was also light and prices which at no time were under Government restriction gradually receded from 14.50@14.75c. per pound, duty paid for spot New York in January, to 7.62½c. at the close of the year. Foreign limits, which at the beginning of the year were 13.50c. c. i. f. New York in bond for January-February shipments from the Orient, or 1c. per pound less than the price of prompt metal here, was at the end of the year 4 to 5c. per pound higher than the New York parity.

Importations of antimony during nine months 1918, amounted to 10,389 tons, the heaviest arrivals being in September, amounting to 2,773 tons.

ALUMINUM.

Government requirements taxed aluminum production to its utmost limit in 1918, the metal being under strict control with a fixed maximum base, first established at 32c. per pound for ingots 98-99 per cent. pure, in March to prevail until June, when a revision advanced the figures to 33c. per pound for 50-ton lots f. o. b. U. S. producing plants, to be effective until September, the same price being extended from that date to be effective until March, 1919, when by order of the War Industries Board it will expire by natural limitation. After the signing of the armistice the Government promptly released supplies for domestic consumption. Export sales were made in November at 38 to 40c. per pound but in December buying was confined to small lots for current domestic requirements. Large buyers who usually cover their needs for the coming year at this season, were holding off in expectation of a probable drop to 20c. per pound in prices. Production during 1918 is estimated at 250,000,000 pounds, a 30 per cent. increase over 1917 output.

OLD METALS.

Old metals, after being rather dull early in 1918, gradually developed into considerable activity with advancing prices throughout the entire list up to the signing of the armistice—an unusually large volume of business having been transacted. After November 11, however, owing to uncertainty which beclouded the future outlook, business became stagnant with heavy price declines ranging from 18c. per pound on pewter, 15c. on block tin pipe, 9c. on the various aluminums, to 6-8c. on coppers and brasses. Lead and zinc were slower in declining but were down 2 to 3c. per pound. With confidence restored in the major markets, there is no doubt but that old metals will rapidly recover.

WATERBURY AVERAGE

Lake Copper. 1918—January, 23.50. February, 23.50. March, 23.50. April, 23.50. May, 23.50. June, 23.50. July, 26.00. August, 26.00. September, 26.00. October, 26.00. November, 26.00. December, 26.00. Average for 1918—24.75.

Brass Mill Spelter. 1918—January, 9.60. February, 9.60. March, 9.40. April, 8.50. May, 8.95. June, 9.50. July, 10.30. August, 10.45. September, 11.20. October, 10.60. November, 10.20. December, 10.00. Average for 1918—9.858.

DECEMBER MOVEMENTS IN METALS

	Highest	Lowest	Average
COPPER:			
Lake	26.00	23.00	25.286
Electrolytic	26.00	23.00	25.286
Casting	26.00	23.00	25.286
TIN	72.50	72.50	72.50
LEAD	7.05	5.75	6.59
SPELTER (brass special)	8.55	7.90	8.33
ANTIMONY	8.75	7.62½	8.19
ALUMINUM	*33.10	*33.10	*33.10
QUICKSILVER (per flask)	\$125.00	\$115.00	\$118.905
SILVER (cts. per oz.)	101½	101½	101½

*Government maximum price for carload lots.

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. page.

Metal Prices, January 13, 1919

NEW METALS

COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER.
Manufactured 5 per centum.

Electrolytic, carload lots	21
Lake, carload lots	21
Casting, carload lots	19½

TIN—Duty Free.
Straits of Malacca, carload lots..Government price. 72½

LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots

SPELTER—Duty 15%.	
Brass Special	8.10
Prime Western, carload lots	7.90

ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory .....	.....
100-lb., f. o. b. factory .....	.....
Ton lots, f. o. b. factory	Government price. 33.20

ANTIMONY—Duty 10%.

Cookson's, Hallet's or American

NICKEL—Duty Ingot, 10%. Sheet, strip and wire, 20% ad valorem.

Ingot	40c.
Shot	43c.

ELECTROLYTIC

MANGANESE METAL

MAGNESIUM METAL—Duty 20% ad valorem (100 lb. lots) \$1.90

BISMUTH—Duty free

CADMIUM—Duty free

CHROMIUM METAL—Duty free

COBALT—97% pure

QUICKSILVER—Duty 10% per flask of 75 pounds

PLATINUM—Duty free, per ounce

SILVER—Government assay—Duty free, per ounce

GOLD—Duty free, per ounce

Metal Prices, January 13, 1919

INGOT METALS

Silicon, Copper 20%.....	according to quantity	49	to 54
Phosphor Copper, guaranteed 15%.....	"	45	to 77
Phosphor Copper, guaranteed 10%.....	"	43	to 46
Manganese Copper, 30%, 2% Iron.....	"	60	to 63
Phosphor Tin, guaranteed, 5%.....	"	87	to 92
Phosphor Tin, no guarantee.....	"	86	to 91
Brass Ingot, Yellow.....	"	16	to 18
Brass Ingot, Red.....	"	23	to 23½
Bronze Ingot.....	"	23	to 24
Parsons Manganese Bronze Ingots.....	"	30½	to 32
Manganese Bronze Castings.....	"	35	to 45
Manganese Bronze Ingots.....	"	22	to 29
Manganese Bronze Forgings.....	"	40	to 50
Phosphor Bronze.....	"	24	to 30
Casting Aluminum Alloys.....	"	33	to 38

OLD METALS

Buying Prices.	Selling Prices.
24.00 Heavy Cut Copper.....	25.50
23.00 Copper Wire.....	25.00
21.00 Light Copper.....	23.00
23.00 Heavy Mach. Comp.....	25.50
14.50 Heavy Brass.....	16.50
11.00 Light Brass.....	13.50
14.25 No. 1 Yellow Brass Turning.....	14.25
21.50 to 22.50 No. 1 Comp. Turnings.....	23.00 to 25.00
7.00 Heavy Lead.....	7.25
5.25 Zinc Scrap.....	5.70
10.00 to 13.00 Scrap Aluminum Turnings.....	11.00 to 14.00
19.00 to 21.50 Scrap Aluminum, cast alloyed.....	21.00 to 23.00
26.00 to 28.00 Scrap Aluminum, sheet (new).....	28.00 to 30.00
55.00 No. 1 Pewter.....	60.00
22.00 to 23.00 Old Nickel anodes.....	25.00 to 26.00
30.00 to 32.00 Old Nickel.....	34.00 to 36.00

BRASS MATERIAL—MILL SHIPMENTS

In effect Jan. 3, 1919

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet.....	\$0.25	\$0.27	\$0.29
Wire.....	.25	.27	.29
Rod.....	.24	.28	.30
Brazed tubing.....	.36	..	.41
Open seam tubing.....	.36	..	.41
Angles and channels.....	.41	..	.46

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet.....	\$0.27	\$0.29	\$0.31
Wire.....	.27	.29	.31
Rod.....	.26	.30	.32
Brazed tubing.....	.38	..	.43
Open seam tubing.....	.38	..	.43
Angles and channels.....	.43	..	.48

SEAMLESS TUBING

Brass 34c to 37c per lb. base.
Copper 35c to 38c per lb. base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod.....	32c. net base
Muntz or Yellow Metal Sheathing (14" x 48").....	30c. " "
Muntz or Yellow Metal Rectangular sheets other than Sheathing.....	32c. " "
Muntz or Yellow Metal Rod.....	29c. " "

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled).....	33c base net
From stock.....	35c base net

BARE COPPER WIRE—CARLOAD LOTS

25¼c per lb. base.

SOLDERING COPPERS

300 lbs. and over in one order.....	40c	per lb. base
100 lbs. to 300 lbs. in one order.....	41c	" " "
Less than 100 lbs. in one order.....	42¼c	" " "

ZINC SHEET

Duty, sheet, 15%.....	Cents per lb.
Carload lots, standard sizes and gauges, at mill, 13c. basis, less 8%.....	
Casks, jobbers' prices.....	16c
Open casks, jobbers' prices.....	16½c

Government supervision of sheet zinc prices terminated Jan. 1, 1919.

ALUMINUM SHEET AND ROD

Sheet Aluminum, outside market contract base price, 42.40c. per pound.

ROD.

B. & S. Gauge.	
¾" to 1" Advancing by 32nds	
1" to ¾" " " 16ths	98% rolled, 43.10 cents per lb.
2¾" to 3¼" " " 8ths	
¾" to ¾", 98% rolled and drawn.....	48.80 cents per lb.

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more, 10c. over Pig Tin. 50 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 25 lbs., 25c. over.
No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over at N. Y. tin price, 100 lbs. or more, 5c. over Pig Tin. 50 to 100 lbs., 12c. over, 25 to 50 lbs., 15c. over, less than 25 lbs., 25c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

LEAD FOIL

Base price—5.75 cents per lb.

PLATERS METALS

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

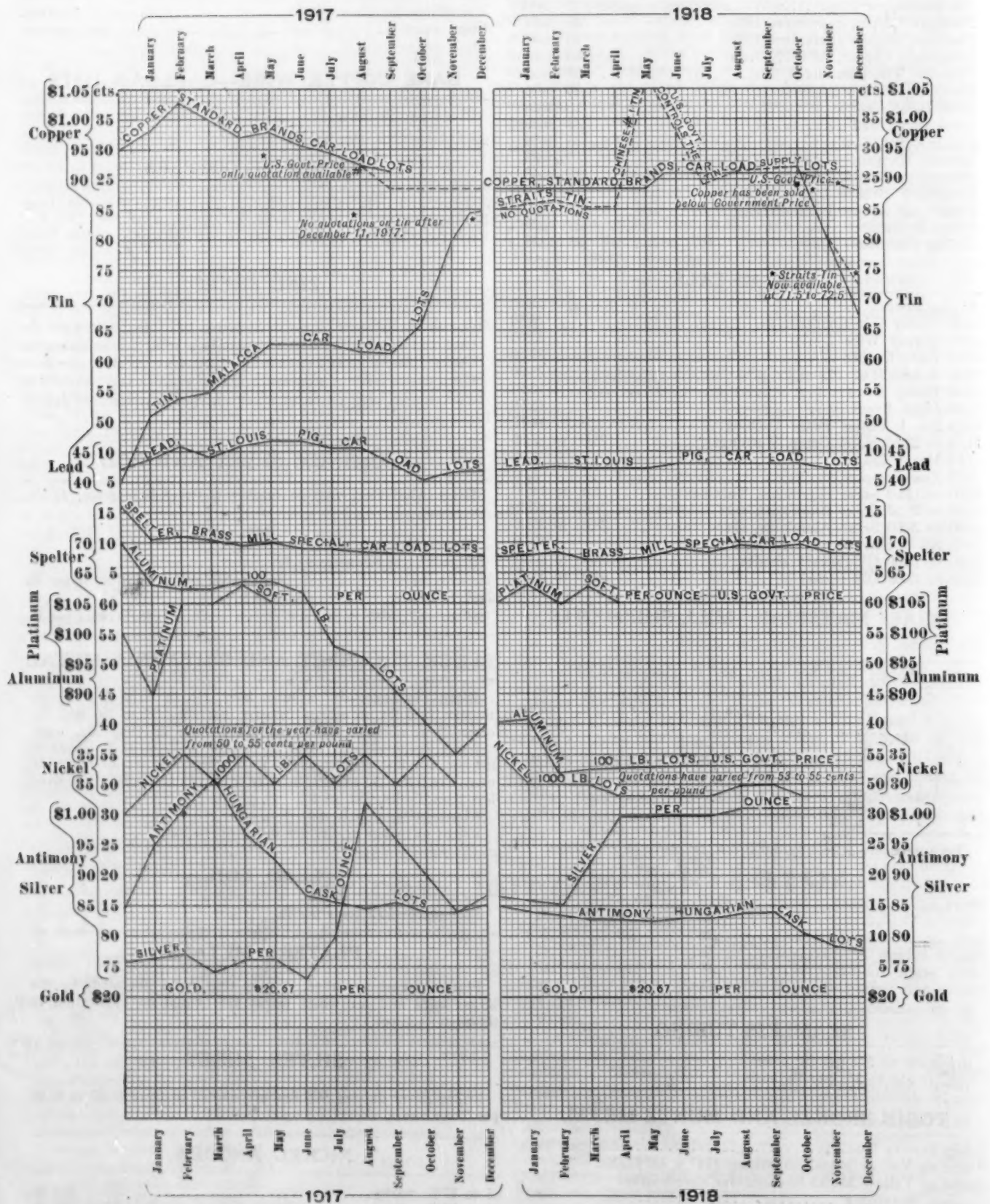
SILVER SHEET

Rolled silver anodes .999 fine are quoted at from \$1.03 to \$1.05 per Troy ounce, depending upon quantity.

NICKEL ANODES

85 to 87% purity.....	55c. per lb.
90 to 92% ".....	57½c. " "
95 to 97% ".....	60c. " "

CHART OF METAL PRICES FOR 1917-1918



Pig Iron and Metal Products of the United States
Calendar Years 1909-1917. (1918 Estimated)

(FROM THE UNITED STATES GEOLOGICAL SURVEY.)

PRODUCTS. METALLIC.	1909		1910		1911		Products.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
Pig iron (spot value), long tons.....	25,795,471	\$419,175,000	26,674,123	\$412,162,486	23,257,288	\$327,334,624	Pig iron
Silver, commercial value, troy ounces...	54,721,500	28,455,200	57,137,900	30,854,500	60,399,400	32,615,700	Silver
Gold, coining value, troy ounces.....	4,821,701	99,673,400	4,657,018	96,269,100	4,687,053	96,890,000	Gold
Copper, value at New York City, pounds	1,092,951,624	142,083,711	1,080,159,509	137,180,257	1,097,232,749	137,154,092	Copper
Lead, value at New York City, short tons	352,839	30,344,154	375,402	33,035,376	391,995	35,279,550	Lead
Spelter, value at St. Louis, short tons...	230,225	24,864,300	252,479	27,267,732	271,621	30,964,794	Spelter
Quicksilver, value at S. Francisco, flasks	21,075	957,859	20,601	958,153	21,256	977,989	Quicksilver
Aluminum, pounds	34,210,000	6,575,000	(h) 47,734,000	8,955,700	46,125,000	8,084,000	Aluminum
Antimony, short tons	12,896	1,231,019	14,069	1,338,090	14,078	1,380,556	Antimony
Nickel, value at New York, pounds.....	19,284,172	10,027,769	25,359,544	13,186,963	890,000	127,000	Nickel
Tin, pounds .....	.....	17,499	.....	23,447	.....	56,635	Tin
Platinum, value (crude) at New York City, troy ounces	638	15,950	773	25,277	940	40,890	Platinum
Total value of metallic products....	.....	\$763,420,861	.....	\$761,257,081	.....	\$670,905,830	

PRODUCTS. METALLIC.	1912		1913		1914		Products.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
Pig iron (spot value), long tons.....	30,180,969	\$420,563,388	30,388,935	\$458,342,345	22,263,263	\$298,777,429	Pig iron
Silver, commercial value, troy ounces...	63,766,800	39,197,500	66,801,500	40,348,100	72,455,100	40,067,700	Silver
Gold, coining value, troy ounces.....	4,520,717	93,451,500	4,299,784	88,884,400	4,572,976	94,531,800	Gold
Copper, value at New York City, pounds	1,243,268,720	205,139,338	1,224,484,098	189,795,035	1,150,137,192	152,968,000	Copper
Lead, value at New York City, short tons	392,517	35,326,530	411,878	36,245,264	512,794	39,998,000	Lead
Spelter, value at St. Louis, short tons...	323,907	44,699,166	337,252	37,772,224	343,418	35,029,000	Spelter
Quicksilver, value at S. Francisco, flasks	25,064	1,053,941	20,213	813,171	16,548	811,680	Quicksilver
Aluminum, pounds	65,607,000	11,907,000	72,379,000	13,845,000	79,129,000	14,522,700	Aluminum
Antimony, short tons	13,552	1,311,348	16,665	1,591,854	16,667	1,572,167	Antim. L'd
Nickel, value at New York, pounds.....	.....	.....	481,565	79,393	845,334	313,000	Nickel
Tin, pounds .....	.....	124,800	(k)	46,699	208,000	66,560	Tin
Platinum, value (crude) at New York City, troy ounces	1,005	45,778	1,034	46,530	6,324	280,885	Platinum
Total value of metallic products....	.....	\$852,720,289	.....	\$880,745,984	.....	\$678,938,921	

PRODUCTS. METALLIC.	1915		1916		1917		Products.
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	
Pig iron (spot value), long tons.....	30,384,486	\$401,409,604	39,126,324	\$663,478,118	38,612,546	\$1,053,785,975	Pig iron
Silver, commercial value, troy ounces...	74,961,075	37,397,300	74,414,802	48,953,000	71,740,362	59,078,100	Silver
Gold, coining value, troy ounces.....	4,887,604	101,035,700	4,479,056	92,590,300	4,051,440	83,750,700	Gold
Copper, value at New York City, pounds	1,388,009,527	242,902,000	1,927,850,548	474,288,000	1,886,120,721	514,911,000	Copper
Lead, value at New York City, short tons	507,026	47,660,000	552,228	76,207,000	540,000	99,000,000	Lead
Spelter, value at St. Louis, short tons...	458,135	113,617,000	563,451	151,005,000	548,597	119,258,000	Spelter
Quicksilver, value at S. Francisco, flasks	21,033	1,826,912	29,932	3,768,139	35,954	3,786,675	Quicksilver
Aluminum, pounds	99,806,000	17,985,500	.....	33,900,000	.....	45,882,000	Aluminum
Antimonial lead, short tons	23,224	3,665,736	24,038	4,483,582	18,646	3,781,560	Antim. L'd
Nickel, value at New York, pounds.....	1,120,556	448,222	918	671,192	402	331,556	Nickel (i)
Tin, pounds	204,000	78,846	280,000	122,000	180,000	111,000	Tin
Platinum, value (crude) at New York City, troy ounces	8,665	478,688	28,088	2,301,762	38,831	4,023,757	Platinum
Total value of metallic products....	.....	\$968,505,508	.....	\$1,551,768,093	.....	\$1,987,700,323	

1918 ESTIMATED.

PRODUCTS. METALLIC.	Quantity.	Value	
		Total.	Per Unit.
*Pig iron, long tons	38,820,000	(i)	(i)
Copper, pounds	1,910,000	\$473,000,000	24.75c
*Gold, ounces, fine	3,313,668	68,493,500	\$20.67
Antimonial lead, short tons	22,000	(i)	(i)
Lead, short tons	541,500	82,308,000	(i)
Spelter, short tons	584,597	4,353,550	(i)
*Quicksilver, flasks	35,000	(i)	(i)
*Silver, ounces, fine	67,879,206	(i)	(i)
*Nickel, pounds	62,994,376	(i)	(i)
*Tin, short tons	10,300	(i)	(i)

(h) Consumption 1910-1911-1912.

(i) Figures not available.

(k) Small production from Alaska, South Carolina and South Dakota.

(*) Figures from *Engineering and Mining Journal*.

Supply Prices, January 13, 1919

CHEMICALS

Acid—	
Boric (Boracic) Crystals.....lb.	.25
Hydrochloric (Muriatic) Com., 18 deg.....lb.	.08
Hydrochloric, C. P., 22 deg.....lb.	.16
Hydrofluoric, 30% .....	.40
Nitric, 36 deg.....lb.	—
Nitric, 42 deg.....lb.	—
Sulphuric, 66 deg.....lb.	.08
Alcohol—	
Denatured	gal. 1.00
Alum—	
Lump	lb. —
Powdered	lb. —
Aluminum sulphate, iron free.....lb.	.15
Aluminum chloride solution.....lb.	.16
Ammonium—	
Sulphate, tech.	lb. .10
Sulphocyanide	lb. —
Arsenic, white	lb. .25
Argols, white, see Cream of Tartar.....lb.	.80
Asphaltum	lb. .35
Benzol, pure	gal. .75
Blue Vitriol, see Copper Sulphate.	
Borax Crystals (Sodium Biborate).....lb.	.15
Calcium Carbonate (Precipitated Chalk).....lb.	.15
Carbon Bisulphide	lb. .20
Chrome Green	lb. —
Cobalt Chloride	lb. —
Copper—	
Acetate (Verdigris)	lb. —
Carbonate	lb. .45
Cyanide	lb. .65
Sulphate	lb. .15
Copperas (Iron Sulphate).....lb.	.06
Corrosive Sublimate, see Mercury Bichloride.	
Cream of Tartar, Crystals (Potassium bitartrate)....lb.	.80
Crocus	lb. .15
Dextrin	lb. .25
Emery Flour	lb. .10
Flint, powdered	ton —
Fluor-spar (Calcic fluoride).....ton	—
Fusel Oil	gal. 4.50
Gold Chloride	oz. 14.00
Gum—	
Sandarac	lb. —
Shellac	lb. —
Iron Sulphate, see Copperas.....lb.	.08
Lead Acetate (Sugar of Lead).....lb.	—
Yellow Oxide (Litharge).....lb.	.20
Mercury Bichloride (Corrosive Sublimate).....lb.	—
Nickel—	
Carbonate Dry	lb. .80
Chloride	lb. .80
Salts, single bbl.....lb.	.16
Salts, double bbl.....lb.	.14
Paraffin	lb. .25
Phosphorus—Duty free, according to quality.....	60-80c.
Potash, Caustic (Potassium Hydrate).....lb.	—
Lump	lb. —
Potassium Bichromate	lb. —

Carbonate, 96-98%	lb. .50
Cyanide, 98-99½%	lb. —
Pumice, ground	lb. —
Quartz, powdered	ton —
Official	oz. .73½
Rosin	lb. .15
Rouge, nickel	lb. .45
Silver and gold	lb. .60
Sal Ammoniac (Ammonium Chloride).....lb.	.20
Sal Soda	lb. .03
Silver Chloride, dry.....oz.	1.00
Cyanide	oz. —
Nitrate, 100 ounce lots.....oz.	.6837
Soda Ash, 58%.....lb.	.08
Sodium—	
Biborate, see Borax	lb. .15
Bisulphite	lb. .15
Cyanide, 96 to 98%.....lb.	.30
Hydrate (Caustic Soda)	lb. .15
Hyposulphite	lb. .08
Nitrate, tech.	lb. .12
Phosphate	lb. .14
Silicate (Water Glass).....lb.	.08
Sulpho Cyanide	lb. .80
Soot, Calcined	lb. —
Sugar of Lead, see Lead Acetate.....lb.	—
Sulphur (Brimstone)	lb. .10
Tin, Chloride	lb. .75
Tripoli Composition	lb. .06
Verdigris, see Copper Acetate.....lb.	.60
Water Glass, see Sodium Silicate.....lb.	.08
Wax—	
Bees, white ref. bleached.....lb.	—
Yellow	lb. .60
Whiting	lb. .05
Zinc, Carbonate	lb. .30
Chloride	lb. .35
Cyanide	lb. .50
Sulphate	lb. .12

COTTON BUFFS

Open buffs, per 100 sections (nominal).			
12 inch, 20 ply, 64/68, cloth.....	base,	\$61.40	
14 " 20 " 64/68, "	"	77.40	
12 " 20 " 84/92, "	"	87.30	
14 " 20 " 84/92, "	"	117.60	
Sewed buffs per pound.			
Bleached and unbleached.....	"	.65	
Colored	"	.55	

FELT WHEELS

WHITE SPANISH—Diameter	Thickness	Price
6", 8", 10", 12", 14", 16", 18", 20" ..	½" or under	\$4.05 per lb.
6", 8", 10", 12", 14", 16", 18", 20" ..	⅝" to ¾"	3.45 " "
10", 12", 14", 16"	1" and over	3.15 " "
6", 8", 18", 20"	1" and over	3.25 " "
7", 9", 11", 13", 17", 19"	½" or under	4.90 " "
7", 9", 11", 13", 17", 19"	⅝" to ¾"	4.25 " "
7", 9", 11", 13", 17", 19"	1" and over	3.95 " "
GREY MEXICAN—Diameter	Thickness	Price
6", 8", 10", 12", 14", 16", 18", 20" ..	½" or under	\$3.95 per lb.
6", 8", 10", 12", 14", 16", 18", 20" ..	⅝" to ¾"	3.35 " "
10", 12", 14", 16"	1" and over	3.05 " "
6", 8", 18", 20"	1" and over	3.15 " "
7", 9", 11", 13", 17", 19"	½" or under	4.80 " "
7", 9", 11", 13", 17", 19"	⅝" to ¾"	4.15 " "
7", 9", 11", 13", 17", 19"	1" and over	3.85 " "